BLUE BOOK

RIGIDITY, POWER,

Speed...

for faster turning and multiple-tool economy

Short of base! Low center of gravity! A bed and headstock cast in one piece from 500 pounds of chrome-molyb-denum-iron! That's why the Lipe Carbo Lathe eliminates all deflection and head weaving. A massive tailstock with a 3st diameter quill . . . and heavy bed sidewalls reinforced by cross ribs . . . give further resistance to torsional stresses and strains.

Rigidity . . . plus brute power and wide range of selective speeds . . . that permit hogging feeds and cuts—and multiple-tool economy—on high Brinell steels, scaly surfaces, sand holes, weld spots and jump cuts. America's first carbide-tool lathe . . designed to give the full advantage of carbide-tool speed, the Lipe Carbo is particularly effective on big lot-sizes and continuous production runs.



Swing over bed......14"
Swing over cross slide
(regular carriage) 7"
Between centers.....18"

LIPE-ROLLWAY CORPORATION
Syracuse 1, N. Y.

HPE

Semi-Automatic CARBO

America's Pioneer Carbide-Tool

LATHE





24 × 24

Structural shapes up to 18" and large bars of equal diameters are sawcut on the No. 18 MARVEL universal Roll Stroke Hack Saws. Cuts
are accurately "square" and clean with practically ne burrs. This
modern saw which is completely armoured to stand the rough handling
unavoidable where large work is done, introduces the new roll-stroke
principle which enables it to cut-off the toughest steel in the largest
sizes rapidly and with extremely long blade life.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave. Chicago 39, U.S.A. Eastern Sales Office: 225 Lafavette St., New York 12, N. Y.

An arc welder needs "innards" to stand up under the strain of present day operation well sir, HOBART has more "innards" than most arc welders. The liberal design of a HOBART you'll find has more copper, more steel, more good insulation, precision bearings and accurate controls, all engineered into a simplified arc welder which makes its performance stand out head and shoulders above the pack.





The Rivett 918 Hand Screw Machine can produce in volume and maintain finish and size to the most exacting specifications. These characteristics have brought ideas into mass production that were once confined to the toolroom. Consider the Rivett 918 for finishing rough blanks or for producing from bar stock.

Write for Bulletin

RIVETT

RIVETT LATHE & GRINDER, Inc.

BRIGHTON

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U. S. A

HARDINGE HORIZONTAL-VERTICAL Collet Index Fixtures with Threaded Nose Spindle are fast in operation and hold work accurately



In addition to taking standard collets, this fixture takes step chucks and jaw chucks to cover a wide range of applications. It will eliminate the necessity of your tool room making many specially designed fixtures. Thus, your engineers and tool-makers will have more time for other work.

A preselector arrangement provides the selection of separrate indexing of any number divisible into 20 or 24. The collet closer lever has a 100 to 1 leverage for quick opening and
closing of collets and step
chucks. Write for bulletin.





5" JAW CHUCK CAPACITY Universal





HARDINGE-SJOGREN SPEED COLLET CHUCKS increase production of your lathes and milling machines



A Hardinge-Sjogren Nose Type Speed Collet Chuck enables you to get full value from your toolroom lathes, engine lathes and milling machines. It gives greater capacity, saves time, increases accuracy and assures better results. An almost effortless turn of the handwheel, one way or the other, automatically opens or closes the collet, releasing or gripping the work as desired. Its grip is adjustable and sure. Production is increased as the operator is always in front of his work. Available in three sizes for 1". 13/4", or 13/4" collet capacity. Write for complete bulletin.



"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"



Machine Tool Blue Book

Hitchcock Publishing Co., 542 So. Dearborn St., Chicago S

Published Monthly

Volume 41, No. 5

MAY 1945

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R. C. Van Kampen, President J. E. Hitcheock, Vice President M. L. Yonts, Secretary Wesley G. Paulson, Editor C. E. Elzings, Circulation Mgr.

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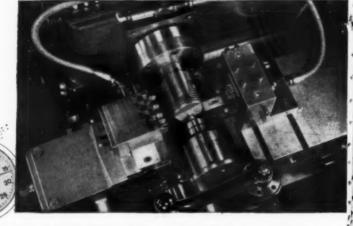
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joistons per minute!



with the GISHOLT HYDRAULIC AUTOMATIC LATHE

This manufacturer, with aluminum pistons to turn out in large numbers, properly assigned the job to the Gisholt No. 12 Hydraulic Automatic Lathe. With the tool set-up shown here, the finish turning and grooving were done at a rate of 180 per hour, net.

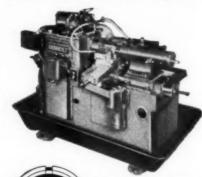
Naturally, this calls for high spindle speeds; smooth, even feeds; quick approach and automatic return traverse of tools; easy operating tailstock, and an airchucking fixture.

Those are the important things about the Gisholt Hydraulic Automatic Lathe. It's flexible, adaptable, fast... ready to handle a variety of between-centers or chucking work. And it's so easy to run that the operator has little to do but load the chuck, and remove the work when finished.

The Gisholt No. 12 means rock-bottom costs wherever the volume is sufficient to warrant automatic machining. Literature on request.

GISHOLT MACHINE COMPANY

Look Ahead... Keep Ahead... With Gisholt Improvements in Metal Turning



THE GISHOLT NO. 42 HYDRAULIC AUTOMATIC LATHE provides independous feeds for front carriage and vear slides, with an infinite selection of feeds from .000° to .0575. Slides feed to positive stops, insuring atmost accuracy in fusibed dimensions. Elimination of feed gears, mechanical trips, cams, etc., greatly simplifies changes of steps.



Inspecting cylinder finning tools in the Wood-Ridge plant of the Wright Acronoutical Corporation, Photograph courtesy the Wright Acronoutical Corporation,

Cool Millions WITH THE HELP OF JONES & LAMSON Optical Comparators



This book "Beyond a Shadew of a Doubt" will tell you more about our Optical Comparators and what they are doing. Proper dissipation of millions of heat units from the cylinders of the 2200 H.P. Wright Cyclone 18's that power the B-29 Superfortress, depends upon the perfection of the cylinder fins. To be sure that these fins are accurate—beyond a shadow of a doubt—the tools that cut them from solid metal are inspected on Jones & Lamson Optical Comparators.

Quality control by the inspection of tools, parts and products, with Jones & Lamson Optical Comparators, is an accurate, rapid process. Objects that require hours to inspect by other means can be inspected in minutes, or even seconds.



JONES & LAMSON

MACHINE COMPANY Springfield, Vermont, U.S.A. Manufacturer of: Universal Turret Lathes - Fay Automotic Lethes - Automotic Double-End Milling and Centering Machines - Automotic Thread Grinders - Optical Compositors - Automotic Threading Dies and Chasers.

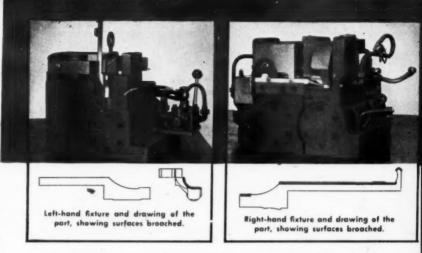
HYDRAULIC POWER FROM MACHINE OPERATES FIXTURES RESULTING IN SEVERAL ADVANTAGES

CINCINNATI No. 5-42 Duplex Vertical Hydro - Broach Machine. Brief description of these productive and dependable machines may be found in Sweet's catalog file. Complete data may be obtained by writing for specification catalog, M-894-2.



CINCIN

CINCINNATI No. 5-54 Duplex Vertical Hydro-Broach Machine, tooled up for two broaching operations on operating rod handle: right side, finger har tip, and spot on tube section (right-hand ram) and 9/16" radius and form (left-hand ram).

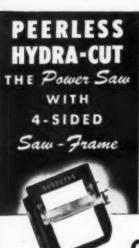


Hydraulically powered machines like the CINCINNATI Hydro-Broach have a potential source of power which may be tapped for external work in conjunction with operation of the machine Taking advantage of this characteristic, CINCINNATI Engineers developed the hydraulic fixtures shown on the No 5-54 Duplex Hydro-Broach (left), for two broaching operations on rifle parts.

This type of equipment, the very latest for modern production methods, offers these important advantages: (1) Easy to clamp and unclamp; hydraulic power does the work. (2) Safer for the operator; provision for interrupted clamping action. (3) Safer for the machine and inserts; operating cycle cannot start until part is fully and properly clamped. (4) Power is available from the machine. (5) Minimum wear.

This is another example of advanced thinking by CINCINNATI Application Engineers and their logical selection and development of fixtures, inserts, and machine to solve a specific machining problem. Let them work with you on your surface finishing operations. Send blueprint of part, along with material specifications, production requirements, sequence of operations, etc.







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THIS busy producer of Aircraft cuts billets and large bar stock the fast, accurate way—with a POWER SAW!

SAWING off test samples for inspection purposes is number one method as approved by government engineers. SAWING does not heat and harden the metal at the face of the cut. The coolrunning, straight - cutting blade removes as little as 1/16" of the

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Remove the handle of the stationary tap, and it becomes a rotating tap.

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of unquestioned accuracy at high production speeds. And because chasers may be reground through 270° circumference, they last 20 to 50 times longer.

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The NATIONAL ACME CO.

170 EAST 131st STREET . CLEVELAND B. OHIO

Acme-Sridley 4-6 and 8 Spindle Ray and Chucking Automatics . Single Spindle Automatics - Automatic Threading Disc and Tags - The Ching - Limit, Mater Standar and Control Station Switches - Standar Cantrilings - Contract Manufacturing

HERE'S WHY SO MANY INDUSTRIAL MANUFACTURERS ARE USING COLD TREATING THEIR PRODUCTION IN

RESULTS Cold Treating Deepfreeze Industrial Chilling Machines . . .

grant.
Purm cost tife increased from 150 to 510 places
put grant.

duction increased from 3,466 to ores shell cases per punch.

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Abunhasan torgings and castings cubilized and against against against against against against against a second against against a second against a sec

Production doubled in shrink-fit assembly of produce handing structs. DECING OF METALS . . .

arytone landing struth.

Production increased 250°C, in the shrink-fit
secondary of a bushing in Dissel pierons.

Identification of the shrinking secol valve (nearth.)

Aircraft instruments and mera pretuned for substratesphere reaction are lives and time. Cald treated occurrentally reserves oftch from optical lesses.

Deepfrees machine used top scorade members parts until forming open less are performed.

TESTING AND MISCELLANSOUS USES . . .

ARDENENS OF METALS . . . Drill tile increased from th so 3th boles per Million current tale increased 17 boors put grand.

STABILITATION OF METALS . . . Dissensional growth complexity significant in regime and all compensati parts of machine profiles. Improves Quality . . . Conserves Production Time . . . and Reduces Operating Costs . . .

COLD TREATING provides industry with a new production technique capable of effecting economies in a wide variety of operations. That's why it has found general acceptance by most of the country's leading manufacturers.

COLD TREATMIG is being used exsensively by industrial organizations working with metals, to increase metal hardness and uniformity of structure—qualities that assure longer part life and better

COLD TREATING is proving highly productive for shrink-fit asset blies by eliminating warping and scoring and saving time in such operations.

COLD TERATIOS is drastically reducing the time required to stabi-lize gauges, gauge blocks and other precision instruments. By following simple, standard procodures it is possible to completely stabilize various types of gauges in a few hours whereas formerly years were required.

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The Deepfreeze -120° F Industrial Chilling Machine is designed to accommodate all of these astrial cold treating operations. Performance records furnish ample proof of the results obin the panel at the left. For com-plete data send for the 40-page Deepfroese Cold Treams Booklet, described below.

How can Cold Treating be Used in Your Production?

There's a way to find out Send us a number of the tools or parts you're using. Submit information on the material and the beat treatment to which they have been subjected. We'll cold treat them, report the treatment to you, and return them for service and performance tests.

. HERE IS COMPLETE INFORMATION ON COLD TREATING . . . A Soque result that includes overvising from the binary of Cold Training to search president. If you are occusioned with pulper, it will broug use operational with concentration of the pulper, it will broug use operation of the contentration of the pulper, it will broug use operation of the contentration of the pulper, it will be content to the contentration of th

many many principle by Database Section Sections and Spilling States.



You can't find it all in books!

GRINDING has become an exact science. And so, much of the standard information users of abrasives need to specify the right abrasive for the job can be found in the books—notably "GRINDING FACTS" by "CARBORUNDUM." Nevertheless, industrial grinding techniques advance so fast these days, the books can't quite keep up. If you have an abrasive problem that cannot be solved by the standard pattern, call a "CARBORUNDUM" Representative. He has access to the latest information from other users and from the "CARBORUNDUM" laboratories.

And there are always the "CARBORUNDUM" Abrasive Engineers. These are the men who know abrasives and their uses from the inside out. They have helped originate many of the present-day standard grinding techniques. They can sit right down with you at the planning stage and help you work out your problems from the start, as they have done for many manufacturers. For the solution to all your abrasive problems consult your "CARBORUNDUM" Representative. He will be glad to be of service. Write to The Carborundum Company, Niagara Falls, New York.



("CARBORUNDUM" is a registered trade mark of and indicates manufacture by The Carborundum Company)



The odds are better than 10,000 to 1 in your favor that you will get the right tool when you select a THOR Portable Electric Screw Driver or Nut Setter. Take guess work out of vital assembly operations with THOR Screw Drivers and Nut Setters. Set every screw and nut to a precise, uniform torque-tension—the adjustment is in the tool. It's impossible to strip threads or over-drive.

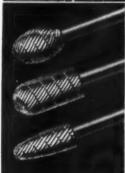
THOR tools assure top speed production in fast-moving assembly lines . . . Today they speed mass production for Victory—tomorrow, they will serve the peacetime needs of the nation. There is a THOR portable tool—electric or pneumatic—for every material or operating condition—available in a complete range of sizes, speeds, torques and capacities.

Write today for copies of THOR pneumatic and electric tool Catalogs.



INDEPENDENT PNEUMATIC TOOL COMPANY
600 W. Jackson Bivd., Chicago 6, Illinois
New York
Los Angeles





Jarvis Flexible Shaft Machines

When used with correctly selected Jarvis Rotary Tools, these multiple-speed flexible shaft machines are the "power hands" of the metal working industry. They will perform many filing, grinding, sanding, buffing, brushing, cutting, and cleaning operations.

Jarvis Ground Rotary Files

The recognized standard in thousands of manufacturing plants for fast, efficient performance. Now furnished with Jarvis Hy-speed Case, increasing tool life an average of three times. Send your high-speed steel rotary files back to Jarvis for regrinding. They will be furnished with life prolonging Hy-speed Case.

Send for our new catalog MFTI

THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.

TAPPING ATTACHMENTS . FLEXIBLE SHAFT MACHINES . GROUND ROTARY FILES



SAVE ON BOTH with Oilstone Files

Production deburring is simplified and speeded up with oilstone files. Precision parts rejected for scratches or burrs can be quickly reworked within tolerance, even after hardening, with these "all abrasive" files.

You'll find oilstone files are all file, not just a surface of tiny cut teeth. Continued use constantly exposes new cutting points. Abrasive files cut hardened parts just as easily as abrasive wheels cut hardened tool steels.

India (aluminum oxide, oil filled) and Hard Arkansas (natural abrasive) Files, offer you a complete size and shape range of over a hundred items, with a finish spread from coarse, medium and fine India to the surgical fineness of Hard Arkansas.

Ask your Behr-Manning Field Engineer or your friendly distributor salesmen about them and write for your copy of our new 14" x 18" color chart, "Industry's Oilstones."

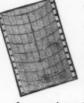


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Also Reliable Coated Abrasives Since 1872

Inspection that CERTIFIES GOOD INVOLUTES as you cut them...

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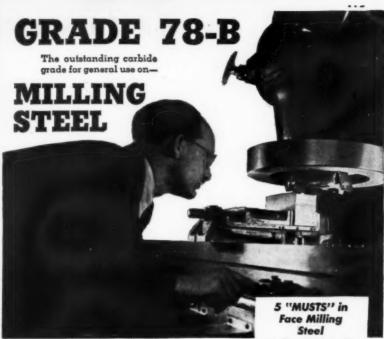


You can "read" every tenth of a thousandth of departure from involute perfection. You can double check the location and amount

of any predetermined modification. With a Recording Type instrument you can chart these records for permanent reference.

Ideally simple. All settings made with standard gage blocks. No extra parts or calculations. As versatile as it is reliable ... Write for descriptive circular and measure its value in guarding you against, costly errors.

THE FELLOWS GEAR SHAPER



For general, all-around use on the milling of steel, you'll find Carboloy Grade 78-B outstanding in performance. Highly resistant to edge wear and cratering—and with the toughness to withstand severe cutting conditions, Grade 78-B takes all commonly used steels "in its stride". It plows through heavy cuts, or skims along on light finishing for prolonged periods of continuous use between sharpenings.

With cutters in your crib equipped with Grade 78-B, you're prepared to "tool-up" immediately with the right carbide grade for most current jobs-ready to "GO" on a wide range of steel milling applications,

Try Grade 78-B-the universal grade for steel milling-today!

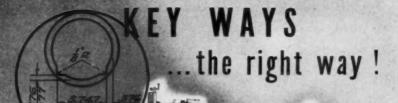
CARBOLOY COMPANY, INC.

11139 E. 8 MILE BLVD. . . . DETROIT 32, MICHIGAN CHICAGO . CLEVELAND . HOUSTON . LOS ANGELES . MILWAUKEE NEWARK . PHILADELPHIA . PITTSBURGH . THOMASTON Also Sold by Leading Mill Supply Distributors

- No. of teeth should not exceed No. of inches in cutter diameter.
- Grinding is vital. Use recommended method.
- 3 Use a flywheel.
- 4. Use negative rakes.
- Position work in relation to cutter so cutting edge enters at negative angle.

Send for these technical manuals: GT-127 (Grinding), GT-174 (Application).





.... Internal shaping is another function of the Shaper requiring accurate performance. Here a Cincinnati Shaper holds close tolerances cutting Kennedy Key Ways in an eccentric.

Write for Catalog N-2



THE CINCINNATI SHAPER CO.

CINCINNATIONIO U.S.A. SHAPERS - SHEARS - BRAKES die costs and assembly time

TESSOL



Sheet metal dies made from Jessop Composite Die Section Material.

COMPOSITE DIE SECTION MATERIAL

With the use of Jessop Composite Die Section Material, blanking or cutting dies can be made at a lower cost, saving from 28% to 47% over the cost of the same dies made from rectangular bar stock.

The cutting edge of Jessop Composite Die Section Material is electric furnace water-hardening tool steel, backed by a tough, son-hardenable steel. When Jessop Composite Die Section Material is used, there is no necessity for machining to shape hocause is is rollled to shape. Slow and expensive hand lapping is eliminated

Jessop Composite Die Section Material is recommended for straight die sections and for slightly bent sections.

and dowel holes may be drilled after

hardening.

Eight different shapes are available in lengths of 8 to 10 feet. Applications include airplane sheet metal dies auto body dies, truck body dies, railroad car dies, metal container dies, and any application in which sheet metals are to be cut to regular or irregular shapes.

JESSOP STEEL

Hond Office and Works

Washington ... Pa.

Substituted 1901

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	Sec. No.	A	B	°c	D	E	F	Weight
	D	13 32	30	1,48	20 32	$2\frac{1}{16}$	$1\frac{3}{8}$	7.25 Hs.
800000	AA	63 61	50°	1/48	$1\frac{1}{16}$	$3\frac{1}{16}$	1 1 1 0	12.5 lbs,
1	A	31 61	301	EBR	110	$2\frac{9}{16}$	1 16	10.83 Bes.
1	SS	63/64	30°	UR	$1_{1\overline{1}}^{1\over \overline{1}}$	$3\frac{3}{16}$	115	It. Ibs.
2	В	31/61	30	1/1R	$1\frac{1}{16}$	3 10	$2\frac{1}{16}$	15.6 lbs.
	BB	63 61	30°	1/4R	110	416	$2\frac{1}{16}$	18.11 Hes.
	С	31/61	30°	1/1R	$1\frac{1}{16}$	$4\tfrac{1}{16}$	$2\frac{5}{8}$	19.3 lbs.
	cc	63/61	30	1/18	$1\frac{1}{16}$	1 16	$2^{11}_{\overline{16}}$	23.94 Bes.

No Wires
No Heating
No Operating Costs

PERMANENT MAGNET CHUCKS

210

... ready for instant use on any machine of suitable size as well as on work bench or surface plate. No electrical connections of any kind are needed. Send for complete catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

For sale only in the United States of America and its Territories and in Canada.

ROTARY MODEL

For use on grinding machines and for holding work for light cuts on lathes. No. 9R — 9" in Diam.

RECTANGULAR MODELS

For use an surface grinding machines — also, for holding work for light milling and planing operations and far bench work.

No. Size, In. No. Size, In.

*255 2% | x 51/4 824 83/4 x 24/4

510 51/4 x 103/4 123/6 121/4 x 36/6

618 63/4 x 183/4 *Differs from illustration.

through the Distributor



BROWN & SHARPE

HEAVY DUTY GRINDING or Light Polishing!

THIS KELLERFLEX MACHINE TAKES BOTH IN ITS STRIDE . . .



This intermediate KELLERFLEX flexible shaft machine (Model J-3) is an all-purpose model - its 1/2 h.p. motor giving it ample power and speed for both heavy and light work. Besides stamina, strength, and remarkable handling ease, it can work all day without heating up, can handle many jobs impossible with ordinary machining methods. The KELLERFLEX J-3 can use . . .

Grinding Wheels up to 6" diameter by 1" face

Sanding and Polishing Drums up to 4" diameter by 2" face Wire Brushes up to 6" diameter

by 1" face Buffing Wheels up to 6" diameter by 1" face

Rotary Files and "Ground from the Solid" Burs up to 2" diameter

Write for full information about this and other KELLERFLEX models and their wide variety of handpieces, accessories, and attachments.

Illustrated is the KELLERFLEX JF-3 this is the J-3 machine mounted on an adjustable roller floor stand (11½" height adjustment). There are several other types of mountings available for this machine. Ask about them.

PRATT & WHITNEY LERFLEX SALES DEPARTMEN WEST HARTFORD 1, CONN.



Taps that Fill the Gaps

PRODUCTION ROLLING

Stick to your War Job!

The work you personally are doing may help to shorten the War and save lives. Our fighting men are depending an you.

Don't let them down! Size of Thread being tepped, 1-31/32"— 16 MS; length of Thread, 12". Humber of dell pass.— Mumber of please perhour in hand operation for band siz-

MURCHEY

SOLID ADJUSTABLE TAPS

TYPE "E" FOUR CHASERS . TYPE "R" SIX CHASERS

Sometimes a machine does not permit the use of a collapsible tap. Sometimes space is too limited. Sometimes sizing operations are required. When such circumstance arise, MURCHEY SOLID ADJUSTABLE TAPS solve the problem. Although not equipped with collapsing devices, they nevertheless have all the other advantages of a collapsible tap. They fill the gap between collapsible and solid taps. Being adjustable, correct decimal size is always maintained. Inserted chasers are readily removed for resharpening. Once you purchase the tap body, you can obtain a wide

variety of thread sizes merely by purchasing other chasers. The chasers, which are less expensive than solid taps, may be replaced when necessary. Write for complete descriptive literature.

MURCHEY MACHINE & TOOL CO.

Detroit 26, Michigan

Murchay manufactures all types of Collapallds Tape, Self Opening Die Heuds, Throud Milling Mackines and Shell Tapping Mackines. Write for catalogs. Address Days, M-2.

MURCHEY

then he said to himself

'Phocey on every good thing'

FEW men are more widely known, and more genuinely detested, than Fuehrer Vidkun Quisling.

... and yet few are his orations by which to measure him.

Recently, however, as the Church gained ascendency in Norway, he resorted to a threeword outburst which pictures his double-cross mentality to a T. Says he:

"Religion is outdated."

Well he knows in his stony heart and warped soul that the advance of religion is something that will undo him

. . . so he ridicules it rather than accepts it.

Since when has he ever TRIED religion?

Many men are all too prone to deride that which they do not know from first-hand expesience

. . . when it is only from firsthand experiences that faith is developed

. . . and that goes for commercial faith as well.



"Outdated!"...he cries

LOOK, VIDKUN, OUTDATING occurs only when men take recourse to

WELDED DESIGN . . . A BETTER WAY



Cost cut from \$1.19 to 65¢ by welded design

THIS shaft mounting of a power scythe was changed over to welded design by Jari Products, Inc., Minneapolis, Minn. Production cost of the former conventional design, shown at the left, was \$1.19 each. Its weight was 3½ ibs. Scrap loss was high due to imperfections.

The welded design, completely machined as shown on the right, is produced for only 65¢—about 45% less than the former design. It weighs only 2½ lbs. Use of rolled steel assures uniform strength and precision of every unit produced.

HOW BUILT



Parts teck-wolded in positioning jig and finish welded with \$/22" "Floatwold 7".

Studies in Machine Design free on request. Write on your letterhead to be placed on mailing list.

THE LINCOLN ELECTRIC COMPANY . DEPT. J-2 . CLEVELAND 1, OHIO

ARC WELDING

Wherever accuracy is important... so is accuracy CONTROL!



• Close-limit machine work calls for inspection standards regularly checked and re-established wherever necessary. Equipment for this kind of gage-testing used to be very costly. But not now. Johansson Gage Blocks are priced as low as \$23 a set, with case—\$3.50 for single blocks. They come in accuracies of .000004 and .000008. They will put your shop on a basis of enduring accuracy. May we send you a catalog with full details—sizes, accessories, prices? Write today.

Johansson Division
Dept. MT Dearborn, Mich.

Every shop that works to thousandths or closer whether on production; adjustments or repairs; needs—





It is reported that

Ball bearings, for precision equipment, are now made with outside diameter as small as two millimeters. Science News Letter.

meters. Science News Letter.

The first cotton crop to be harvested entirely by machine has recently been reported. The result seems to be a lower grade of cotton offset by reduced cost. Time.

get ready with CONE for temperow

Postwar automobile wheel rims are to be wider, or about three-fourths of the tire width. National Wheel Rim Assn.

get roady with CONE for tomorrow

The combined use of the electron microscope and the three-dimensional vectograph is making possible better observation of the structure of metals and consequent improvement of alloys. Dow Chemical Company.

get ready with CONE for temperow

A new product is intended to seal the spaces between spot welds and make a continuous liquid-tight joint. Presstite Engineering Co., St. Louis. ast ready with CONE has been proved

A new system of aircraft engine lubrication is claimed to supply an adequate flow of oil as high as 45,000 feet. Pena: State College and Sharples Co., Phila.

get ready with CONE for tomorrow

The number of persons employed in individual research laboratories just about doubled in the ten years ending in 1940. G. Edward Pendray, Asst. to President, Westinghouse Electric & Mg. Co.

get ready with CONE for tomorrow

A new process of adding carbon black to liquid rubber latex will, it is hoped, reduce the cost of tires and add to their service. General Tire & Rubber Company.

get ready with CONE for temorrow

It is claimed that one of the new rechargeable flashlight batteries will outlast 400 of the usual dry cell type. B. F. Goodrich Co. A new 4 by 6 foot "tectonic" map of the United States shows the complete geologic structure of the country and is said to be the first of its kind ever published. American Assn. of Petroleum Geologists.

get road; with CHNE for tomorrow

A new device called the "Odograph" automatically makes a map, in any scale, of a road while being carried in a fast-moving automobile. U. S. Army Engineer Corps.

get ready with CONE for temorrow

A jet propulsion drive for torpedoes has recently been patented. Science News Letter.

get ready with CONE for tamarram

A portable electrostatic air cleaner is used to precipitate the smoke produced by welding. Westinghouse Electric & Mfg. Co.

A manual of instruction in the making of aerial "highway signs" for the guidance of aircraft has just been published. Civil Aeronautics Administration.

get roady with CONE for temorrow

The Combined British Astronautical Societies have designed a "space ship" in which they propose to send three men to the moon in about 48 hours. Electronic Markets.

not ready with CONE for temperow

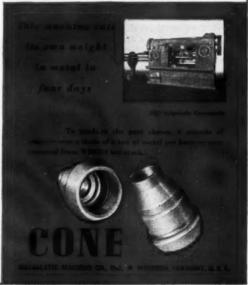
An automobile manufacturer is already planning the assembly-line production of helicopters. Nash-Kelvinator Corp.

got roady with CUNE for tomorrow

A new material for shoe soles is said by the maker to be lighter and more durable than leather and resistant to oil and water. B. F. Goodrich Co.

got roady with CONE for tomorrow

More than 80,000 farmers obtained government priorities to electrify their farms, in 1943, as a means of increasing food production. The 1944 total will probably reach 120,000. EMPIC No. 8.

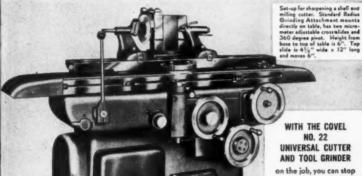




STANDARD MILLING CUTTERS

L NO. 22 UNIVERSAL





WITH THE COVEL NO. 22 UNIVERSAL CUTTER

on the job, you can stop worrying about the high cost of cutter replacements. Mount a COVEL Standard Radius Grinding Attachment on the No. 22 and put that pile of dull cutters back to work - with cutting edges perfectly sharpened and ready to knock production costs into a tailspin.

See your nearest COVEL Dealer or Write for Bulletin BB-55



May, 1945

MACHINE TOOL BLUE BOOK

29

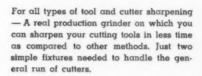




The Fastest...PRODUCTION TOOL GRINDER

on the Market*

* Actual statement of a user of several machines.



The Ace is easy to set up — fast and simple to operate — operator stands in a comfortable position — clearance by direct reading — radial relief if desired.

The Ace is doing a BANG UP job for both Cutter Manufacturers and Users. Its many features will appeal to you. Make your next cutter grinder an OLIVER ACE.

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OLIVER INSTRUMENT CO.

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OLIVER

Don't Neglect Your Toolroom It's the Backbone of Production!

AUTOMATIC DRILL GRINDERS — TOOL AND CUTTER GRINDERS —

DRILL POINT THINNERS — TEMPLATE TOOL GRINDERS —

FACE MILL GRINDERS — DIEMAKING MACHINES

Cut illustrates the

ACE Universal Tool and Cutter Grinder with Anti-Friction

Head - handles a complete range of

cutters and tools.

Machine Gun Speed

Rifle Accuracy





Write today for Bulletin 318 which gives complete capacities.

For those punching jobs where holes must be accurately placed and where speed is desirable, a Buffalo Rapid Acting Punch will give you the speed with accuracy. Made in 6 sizes, with capacities up to 1" x 1". Single and multiple punch heads available.

Electrically welded steel plate frame is comparatively light but far stronger than cast iron.

BUFFALO FORGE COMPANY

161 Mortimer Street Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd.,
Kitchener, Ont.



Rapid Acting
PUNCHES



These rugged, streamlined grinders are modern in every respect. They are unsurpassed for most rapid rough grinding and finishing of carbides, stellite, high speed steel and other modern tools.

> Furnished in bench or floor type, of several capacities, for wet or dry grinding, as desired. Attachments for chip breaker and drill grinding.

A FEW SALIENT FEATURES:

- · Quick-acting indexing tables.
- · Adequate wet-grinding equipment.
 - · High Grade ball bearing spindles.
 - Oversize wheels, giving longer wheel life, and permitting grinding of larger tools. Moderate price.

Prompt Deliveries Write for Details

THOMAS PROSSER & SON

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THE Springfield PRECISION LATHE

Tool Room Lathes are equipped with lead screw reversing mechanism, producing right and left hand threads and feeds. Has automatic stops for both lead screw and feed rod. Oil pan is also included as regular equipment. Bed constructed of High Test Nickel Chrome Gray Iron.

Gear box is tongued, grooved and bolted to front of bed and is the enclosed type to exclude dirt and chips from gears. Wide gears and heavy shafts with ball and bronzed bear-

ings used throughout.

36 changes of threads and feeds are obtained, and in connection with the reverse gears, either right or left hand threads can be produced without the use of wrenches.

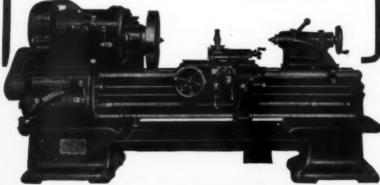
Massive tailstock, designed and constructed with long bearings on bed, is commensurate with the powerful headstock. All bearings and

ways are oiled from one well.

Regular equipment includes large and small face plates, tool posts, steady rests and all necessary wrenches. Motors are located in large cabinet leg under head stock connected to machine by either V belts or silent chain drive.

BUILT TO GIVE MAXIMUM VALUE





THE SPRINGFIELD MACHINE TOOL CO.

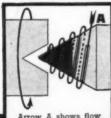
SPRINGFIELD

OHIO, U. S. A.



-Your Assurance of "Red Hardness"

Under the Most Severe Shop Conditions!



Arrow A shows flow of lubricant around helical groove.

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This "Red-Hardness", abrasion-resistant alloy is torchwelded (not brazed) on to the center tip—midway from point as illustrated. Torch welding fuses the cobaltungsten alloy with the steel base of the center and assures a new standard of rigidity and long economical service. Mail coupon for circulars on "Red Hardness" Centers and standard Helical Groove Centers.

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Please send circulars on CMD Helical Groove Centers with "Red Hardness" Tips and CMD standard Helical Groove Centers.

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RIVETING COST DOWN!

New "highs" in production, new "lows" in unit cost start the day you change from solid

New "highs" in production, new "lows" in unit cost start the day you change from solid rivets to tubular or split rivets and Chicago Automatic Rivet Setters. Chicago Riveting is fully automatic . . . the rivet is fed, inserted and clinched with each trip of the foot pedal.

Have Chicago Rivet engineers analyze your rivet cost reduction possibilities now. Send us loose samples of your assemblies . . . we return them fully riveted, with accurately estimated riveting time schedules. When Army and Navy men see how much faster and better Chicago Riveting is, their usual advice is "Change now to Chicago Automatic Riveting."

Typical Chicago Automatic Rivet Setter. Other models available for setting up to 4 rivets at a time...bench or pedal types.

Chicago Rivet & MACHINE CO.

9600 W. JACKSON BLVD., BELLWOOD, ILL., (Chicago Suburb)
TUBULAR AND SPLIT RIVETS IN ALL RIVET METALS



Do It

Better!...on a

30" Heavy Duty Lethe with 13" Hole in Spindle



Large Hollow Spindle Type

Look around your own shop—you may find a number of machining jobs which possibly could be done better on Large Hollow Spindle Type of HYDRATROL LATHE. Send us prints of these difficult or too-costly jobs, for a specific, timeand-money-saving recommendation.

FOR FASTER PRODUCTION . BETTER WORK . LOWER COSTS!

5 SIZES - 18" to 36"

 Small
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 18" up to 7 %" Hole

 Medium
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 24" up to 12"
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 Large
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(Standard type lathes, 16" to 36")





OU'LL check work between centers easier, faster and within limits of 0.0001" on this improved Sundstrand Bench Center.

 "One-hand control" over all movable elements leaves the operator's second hand free to control the part being checked. Both headstock and tailstock can be unclamped, positioned and locked in place with a single hand operating the top lever on each.

 The tailstock center is quickly clamped or unclamped by means of the front lever, while the end bar retracts the spring-loaded center. In addition, the indicator support can be manipulated with one hand while moving it away from the work for loading and unloading, and against the work for checking the runout.

 Center holes of headstock and tailstock are bored together for precision. The heavy ribbed base prevents deflection under clamping and assures a longer lifetime of accurate work. Easy to clean, compact, portable . . . can be placed on bench or on a stand convenient to the work.

Available in 6 sizes from 6" x 18" to 12" x 72" Write for complete specifications and prices today.





Powerful CHICAGO STEEL PRESS BRAKE



FUL, rugged, inexpensive Press Brake, designed and built to the standards of Chicago Steel Forming Presses.

This No. 255 is a POWER-

This money-saving production tool will handle 40 to 50 percent of the work done in an average shop. Greater speed, higher efficiency—much lower operating cost—plus the highest quality material and sturdy welded construction as in our larger machines.

Standard Series — 3 sizes — capacities 14 gage, 4 ft. long; 16 gage, 5 ft. long; 18 gage, 6 ft. long.

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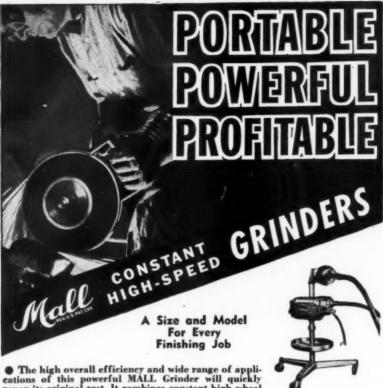
We also build special machines for intricate bending operations.

Take advantage of our experience of over 40 years by sending to us any difficult bending problem you have.

WORLD'S LARGEST MANUFACTURER OF HAND BENDING, POWER BENDING AND POWER PRESS BRAKES

DREIS & KRUMP MANUFACTURING CO. 7440 LOOMIS BLVD., - - - CHICAGO, ILL.

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repay its original cost. It combines constant high wheel

speed with ball-bearing mounted straight and angle spindles to assure swifter, smoother wheel action, longer tool life, fewer rejects, and a faster cleaning and

finishing rate.

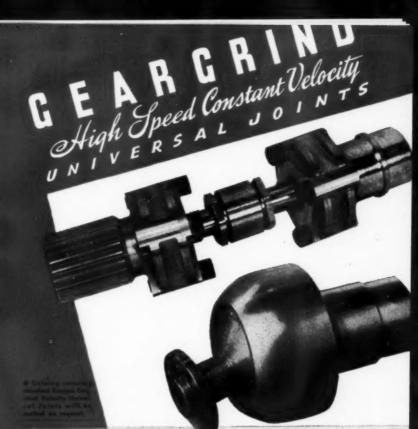
The working tools are light in weight and easy to handle and quickly interchangeable. The heavy duty motor swivels to make power available in any direction. The unit can be rolled right up to the work saving steps and material handling. Plugs into any regular electrical outlet. Adaptable for Grinding, Disc Sanding, Drilling, Polishing and Buffing.

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Investigate the comprete line of QSARGARINO Mechines for the Formed Wheel Geneling of extended and interest govers, external and feterant levelors spilers, similarly applied, servitions and coults. After appoint QSARGARINO fleekillings for appoint grinning fleekillings for appoint grinning.



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New Enlarged Handbook Gives FACTS About This Unusual High Speed Steel

• The Fifth Edition of the 57-page MO-MAX Handbook gives a wealth of infor-mation about high speed steels. Whether or not you are now using MO-MAX, you should send for a copy of this clear, concise booklet.

Included among its contents are details on the standard and special analyses of MO-MAX . . . brief instructions on forging, annealing, hardening, quenching, tempering . . . the new sub-zero treatments . . . tool performance . . . comparison of microstruc-tures of MO-MAX and 18-4-1 high speed steels . . . Rockwell hardness curves and

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Tests conducted over a period of years have proven that MO-MAX gives better-thanaverage performance in drills, reamers, lathe tools, cut-off tools, tool bits, milling cutters, hobs, circular saws, thread rolling dies, counterbores, broaches, lathe centers, spot facers, circular and flat forming tools, dies for both hot and cold work, taps, thread chasers, etc. The new Handbook tells how you, too, can utilize the

advantages of this remarkable high speed steel. Use the coupon below.



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OFFERS SPECIAL MACHINES
FROM STANDARD UNITS

Fitchburg automatic multiple precision grinding offers the same profit possibilities that up-to-date shops now earn with multiple tooling and combined cutting on machined work.

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On hundreds of parts like those shown, for machine, automative or ordinance work, Fitchburg engineers can help you to make sure your orders are filled on time, and at the lawest possible cost. It will not obligate you to mail in your blueprints for study. Catalog shows wide range of other successful applications. Write for a copy today on your business letterhead.

When installing special grinding equipment it is important to remember that the Fitchburg Bowgage Grinding Wheelhead is a self-contained standard until It can be remounted on standard machines, or on new special bases, for operatines other than the one originally specified. This Fedure protects your investment.





This book shows how to cut grinding costs ... Sant free...write for is teday.





SEVERANCE MIDGET MILLING CUTTERS TAKE DEEP SHARP BITES

On metal, wood or plastic parts, castings or patterns Severance cutters take deep sharp bites instead of merely burnishing. They throw off clean chips instead of dust.

For every type of finishing and deburring, Severance cutters do a quicker, faster job than ordinary rotary tools, rasps or burrs. Equally efficient with portable power tool, with stationery ser-up or by hand.

Severance cutters can be successfully reground scores of times without losing their effective cutting qualities.

If you are having difficulty in finishing any manufactured parts, send us samples and our engineers will design cutters to solve your problems.

Severance "Carbide" Midget Milling Cutters are available in a wide variety of shapes and sizes.





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If someone told you that your chipping hammers were operating at only 60% cutting efficiency, you wouldn't believe them. Yet it has been found that even good operators cannot be relied upon to find 20% or less difference in the cutting ability of a group of hammers. That difference must be found by measuring the actual metal removed.

Recently a large plant asked our "cutting efficiency service" engineers to check their hammers. Tests soon showed that most of them were in very poor operating condition, so all types were shipped to our factory for a standard comparison cutting test against master hammers. Reports showed that they varied from 40% to 70% low in C. E. and were 6% high in air consumption.

From the tests it was obvious that the continued use of these hammers would cost thousands of dollars. Those beyond economical repair were replaced with I-R Flapper-Valve hammers and the balance were repaired as outlined by our service engineers. Production costs were reduced and more chipping per operator resulted,

An I-R service engineer will be glad to show you how to maintain the highest cutting efficiency for your hammers. A copy of our handy two-color Chipper Repair Wall Chart is yours for the asking.

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Special Red Tang Long-Angle Lathe File removes stock quickly and amouthly, without clogging.

...with SIMONDS RED-TANG FILES"

Workers like Red Tang Files because they can remove more stock with less elbow-grease. And management likes them because they stay sharp and last longer, giving more "filemileage" per dollar. Red Tang Files cut (instead of scrape) with teeth designed like the teeth of a Simonds metal-cutting saw...cut up long. even chips.

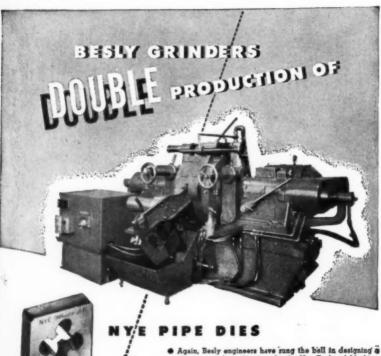
saw . . . carl up long, even chips.

Made under ideal conditions in the world's first windowless, plant, Simonds Red Tang Files come in only one quality . . . the highest standard to which any file can be made. So next time you need standard files, tell your dealer specifically to send you Simonds Red Tang. Then measure the extra value you get.

BRANCH OFFICES: 1350 Columbia Road, Boston 27, Mass.: 127 S. Green St., Chicago 7, Ill.: 228 First St., San Francisco 9, Calif.: 311 S. W. First Ave., Portland 4, Ore; 31 W. Trent Ave., Spokane 8, Wash.



GUT THE WAR SHORT ... BUY WAR BONDS ... AND THEN BUY MORE WAR BONDS



production grinder—this time for the Nye Tool and Machine Company. Nye's problem was to step up their output of pipe

threading dies without sacrifice of quality in the accurate grinding of parallel surfaces.

With the features of the Besly No. 226 double-spindle grinder as the basis, the grinder, illustrated above, was developed to grind relatively large areas—dies up to 5 x 5". Nye specifications call for the removal of .020 on both sides.

Output was doubled on dies 21/2"x 21/2", and smaller, with the aid of a special hydraulically-operated fixture which passes two dies between the grinding wheels while two more are being fed into it at the opposite end. This means that loading and grinding operations are practically continuous.

When grinding operations call for special equipment, let Besly help you. Besly engineers, with a "know how" accumulated over half a century, can match your needs with the right grinder and the right abrasive - to do the job as it should be done-quickly, accurately and at low cost.

BESLY TITAN ABRASIVE WHEELS

CHARLES H. BESLY AND COMPANY, 118-124 N. Clinton St., Chicago 6, III. . Factory: Beloit, Wis.

LABORATORY

Built to Elmes Big-Press Standards of Performance

PRESSES

Small presses that are built right quickly pay for themselves in time and money saved.

In machine shops, tool rooms, and assembly and maintenance departments these *capable* little units are most welcome additions to plant facilities.

Inspectors use them for quick checks on purchased materials, for sampling tests on work in process, and for final inspection of finished products.

Industrial and commercial laboratories, universities, and colleges find these versatile small presses indispensable in development work on new products, new processes.

—and for short runs and small jobs of many kinds, a good laboratory press is itself an ideal production machine.

Ask us for Bulletin No. 1035A. It gives prices and complete specifications on 20, 30, and 50-ton models. All have Elmes precision-built hydraulic units with honed cylinder and wing-type regrindable valve.

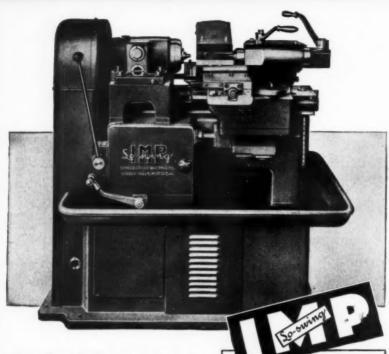
ELMES HYDRAULIC EQUIPMENT

Two-celum, 20-ten Medel Ne. 3429. Over-all dimensions: 17" x 15" x 41" high. Opening: 0" to 16". Platen: 8" x 8" with full guides encircling both columns. Ram: 3" diam., 6" stroke. Weight: 425 lbs. Price, with gauge and lever extension, \$168.00. Electric het plates with "Off-On" switch, \$40.00; with thermostatic control and temperature-setting indicator for 110-220 V., A.C., \$55.00. Other accessories: See Bulletin No. 1035A.

ELMES ENGINEERING WORKS OF AMERICAN STEEL FOUNDRIES, 244 N. Morgan St., Chicago 7, III.

Also Manufactured in Canada

METAL WORKING PRESSES PLASTIC MOLDING PRESSES - EXTRUSION PRESSES - PUMPS - ACCUMULATORS VALVES - ACCESSORIES



For High Speed Accuracy

• For small work demanding high speeds, fine finishes and extreme accuracy, the fully-automatic IMP has carned an enviable reputation. Its sturdy, compact design makes it likewise suitable for turning heavier work such as small pistons, bushings, gear blanks, etc.

Because of its integral unit design, the Lo-swing IMP lends itself to practically unlimited tooling possibilities. A Third Slide or Over-arm is available for additional facing, grooving and chamfering operations—either roughing or finishing. Write today for Bulletin N-42, fully describing this versatile laths. SENECA FALLS MACHINE CO., SENECA FALLS, N. Y. ... with

- * SIMPLIFIED CHANGE-OVER
- * SMOOTH, HIGH-SPEED DRIVE THRU MULTIPLE "V" BELTS.
- * SPINDLE MOUNTED ON SE-LECTED PRECISION BALL-BEARINGS FOR SPEEDS UP TO 5000 R. P. M.
- * FINE FEEDS FOR DIAMOND TURNING.
- * UNIQUE HEAD AND TAIL-STOCK DESIGN PERMITS CAR-RIAGE SLIDE TO PASS BY.
- * MANY FEATURES THAT REDUCE SET-UP TIME.

LATHE NEWS from SENECA FALLS



PLASTICS, RUBBER, WOOD . . . Here's a machine every operator likes. Its performance is an attention holder every minute. Its speed is a real challenge-

as fast as he cares to make it go, up to 12,000 r.p.m. The 3,300 pounds of weight make the DoALL Zephyr practically vibrationless when cutting the tough new metals, alloys and laminates used today for war production and in the

Your output can be doubled without extra effort. It's just a matter of increasing the speed and guiding the work.

Want to see it work? Phone your DoALL man for a demonstration in your own plant, or write us.



there's no waiting for the Zephyr to catch up. It travels just

Angle Cutting

Because of the 36" throat and tilting worktable, true angles are cut in 20% to 50% less time than by cut-off methods.

Send for Circular

Learn something about the remarkable performance of the DoALL Zephyr from our letest Mustrated circular.







future for civilian needs.















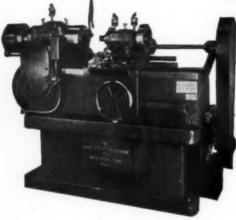


CONTINENTAL MACHINES, INC.

1300 S. Washington Avenue . Minneapolis 4, Minn.

THE COULTER





FOR THE RAPID
DUPLICATION OF
RIGHT OR LEFT
HAND THREADS
---INTERNAL OR
EXTERNAL

Any parts that can be held in ordinary chucks, air operated chucks, air operated collet chucks, or special face plate fixtures . . . can be threaded on this machine.

Set cam-controlled automatic cycle on first piece. Thereafter, cutter feeds into work to proper depth and at correct plich and withdraws when cut is completed. Work and cutter spindles are driven by individual motors through worm drive, affording ample power throughout the wide range of speeds and feeds.

Write for Details and Specifications.

The James COULTER Machine Co. BRIDGEPORT . CONNECTICUT . U.S.A.



here was a time, not so many years ago, when the words "Made by Hand" were synonymous with highest quality. In some things this still holds true.

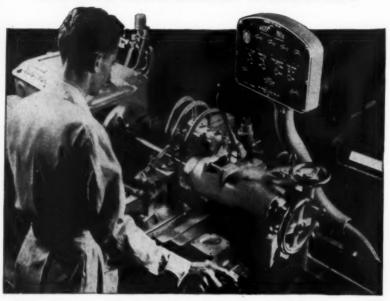
But it is equally true that many operations can be done better and faster, with a greater degree of efficiency, when a Haskins Flexible Shaft Machine is used. And this with much less strain and fatigue on the part of the operator.

Grinding—Sanding—Rotary filing—Wire brushing—Buffing and Polishing—all are machine operations. There are many more. Write for Catalog 45, showing many ways to save your hands and speed production with flexible shaft equipment.

R. G. HASKINS CO. 623 South California Ave., Chicago 12



JUST A TWIST OF THE WRIST CONTROLS THE MONARCH MAGNAMATIC



Convenient controls allow fast setup and easy operation of the modern double-carriage, all-electrically controlled Monarch Magnamatic.

Handwheels with micrometer adjustments permit quick setups for economical turning even of short runs. One button on panel controls operating cycle. Six different feed rates can be automatically selected for maximum metal removal or different finishes on various parts of the work.

For automatic or semi-automatic operation on short or long runs, the Monarch Magnamatic will more than pay its way by reducing costs on a wide variety of turning, boring or facing work. Ask for detailed information.

THE MONARCH MACHINE TOOL COMPANY . SIDNEY, OHIO

The Quick-As-Wink design incorporates simplicity, trouble-free service, and ease of application.

Consider this bar shear built by McKay Machine Company, Youngstown, Ohio. A Quick-As-Wink hand operated valve controls the hold down and clutch. A Quick-As-Wink foot valve operates the feed roll. The designer of the shear has this to say about Quick-As/ Wink valves:

"They are the best valves for this type of shear We use them because of the simplicity of operation, speed, accuracy, and long life."

C. B. Hunt & Son manufactures solenoid/hydraulic, air, hand, foot, and diaphragm operated valves for air, water, or oil applications up to pressures of 8,000 pounds, in standard and special sizes.

The Hunt catalog carries complete, engineering data. Send for a copy.





B. HUNT & SON 1835 E. Pershing St.

CANEDY-OTTO RADIAL DRILLS

USED THE WORLD OVER

SPECIFICATIONS:

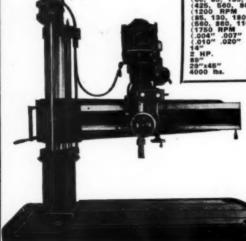
Drills to the center of circle on base or table Length of arm Greatest distance from spindle to base Minimum distance from spindle to base Minimum distance from spindle to celumn Traverse of spindle Morse Taper Diameter of spindle at nose Traverse of arm on column motor Spindle spi

Spindle speeds with 1800 RPM motor

Feeds per revolution of spindle

Bearing of arm on column Size of main driving motor Height of drill column ever gears Working Surface of Base Nat weight

3' Arm	4' Arm	B' Arm
731"	96"	120~
431"	48"	48" 17"
104"	48" 15" 10" 91"	17"
91" 101" 91" No. 4	94"	10"
21"	No. 4	No. 4
25 3"	361"	481"
(60, 85, 136 (425, 560, (1200 RPM	0, 180,	on all models
(1200 RPM (85, 130, 1) (560, 860, (1750 RPM	80. 274, 1180,	on all medals
(1750 RPM (.004" .007 (.010" .020'	19	on all medala
14"	16"	18"
2 HP. 89" 29"x45"	2 HP.	2 HP.
29"x45" 4000 hs.	36"x60" 6200 lbs.	36"x88" 7000 iba.



Canedy-Otto has been the manufacturer of first-class, high-grade drilling units since 1892. These units are available in single spindle, multiple spindle and radial.

We can help you solve your drilling problems. Send for information on our complete line.

Early delivery possible.

CANEDY-OTTO MFG. CO ILLINOIS CHICAGO HEIGHTS.

On dozens of finishing jobs ...

YOU'LL DO BETTER WORK WITH AN EASY-HANDLING SKILSANDER!



 Belt Type SKILSANDERS are so light in weight, so powerful, compact and perfectly balanced that they make it easier for any workman to get a finer finish faster on all flat surfaces of wood, metal or compositions.

And to help you keep your costs down, SKILSANDERS are quality-built throughout to last longer and operate for less with a minimum of servicing.

Ask your distributor to show you on your own work how Belt Type SKILSANDERS will save time, labor and material handling. Phone him today for a demonstration.

SKILSAW, INC. 3033-43 Elsten Ave., Chicago 30, III. Factory Branches in All Principal Cities

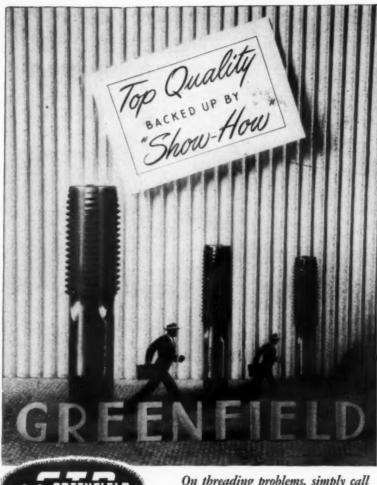


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Skiltools

MADE BY SKILSAW, INC.







On threading problems, simply call your "Greenfield Man" through your "Greenfield" Distributor.

GREENFIELD TAP and DIE CORPORATION . GREENFIELD . MASSACHUSETTS

Taps · Dies · Gages · Twist Drills · Reamers · Screw Plates · Pipe Threading Sets



★ Advance! Advance! Advance! This is the Order of the Day.

Lives of our men are saved in these advances by smashing fire-power on land, at sea and in the air.

Your Army and Navy TAKE NO CHANCES. To prevent jammed guns, their Ordnance experts have designed gages like these produced by Quality—which in ONE swift operation check the contour and ALL outside dimensions of cartridge cases. In this way, every gun can be depended upon to deliver shell-fire that is hell-fire for the enemy.

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QUALITY TOOL & DIE CO.

Manufacturers of "Quality" Products

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Do you want GREATER PRODUCTION-FEWER REJECTS-LOWER COSTS-BETTER FINISH On Parts Like These?





Stainless Steel Load Compensator Valve Sect. Hole is haned to .0002" limit.



Roller Bearing Outer Race, Finish Improved from 12 micro-inches to 2 micro-inches.



Inner Bearing Ring "Accurately removes last 'henth' of stock."



Saved time in producing a smooth occurate finish on this branze relate control valve



Aviation Hydraulic Cylinder made of Aluminum-Alloy, Improves the quality of the beering surface. An extremely smooth surface-finish in secured.



Hydraulic Two-Way Control Volve, Hole is honed to eliminate leakage.



Automobile Distributor Shaft Gears. Toper removed at a rate of 80-90 per hour.



Diesel Engine Fuel Injector Cylinder "Se accurate that a piston can be fir within .00005 lingh,"



Mild Steel Clevis. Honing corrected errors of previous operations and maintained true alignment of two failus.



The coveted Army-Nevy "E" waves over the Sumen plant—evidence of the important part Sumen equipment is playing in the war effort.

The Sunner Precision Honing Machine handles any internal finishing job from .185" to 2.625", with accuracy guaranteed. Super-smooth finish of from 2 to 3 micro-inches can be produced.

Does not require skilled labor — you need no jigs nor fixtures — can be set up in one minute — and is economical to operate.

Find out how these advantages can be applied to the problems in your plant. A Sunnen engineer will be glad to call at your convenience — or write for a free bulletin.

SUNNEN PRODUCTS COMPANY

7935 Manchester Ave., St. Louis 17, Ma., Canadian Fastory: Chatham, Ont.

SUNNEN HONING

· SPEED · ACCURACY · FINISH ·



High Production - Money Making
MULTIPLE SPINDLE DRILLHEADS



THRIFTMASTER PRODUCTS

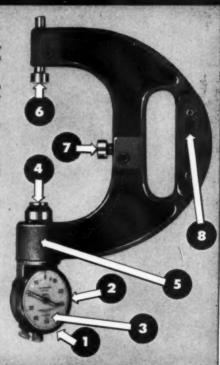
THOMSON INDUSTRIES, INC.

2900 Review Avenue - Long Island City I - New York

SHEFFIELD SNAP GAGE

FOR INSPECTION AND CLASSIFICATION

- 1 Gage may be used with dial either at the bottom or the top, whichever is more convenient.
- 2 Diel is adjustable radially and can be swung through 360° to facilitate reading.
- 3 Scale has a range of .005"—each graduation .0001".
- 4 Movable anvil is spring utged for constant gaging pressure, but spring has no effect on indicator. Special spring pressures available.
- 5 Movable anvil bearing is long enough to preserve alignment with the fixed anvil.
- 6 Fixed anvil is adjustable to a maximum of one inch.
- 7 Adjustable backstop has a cylindriand face for accurate line contact.
- 8 Comfortable handle with plastic grip to insulate gage from heat of inspector's hand.





THE SHEFFIELD CORPORATION

Dayton 1. Ohio, U.S.A.

EACHDING DISTOURSED CONTRACT CONTRACT

MACHINE TOOLS - GAGES - MEASURING INSTRUMENTS - CONTRACT SERVICES

Progressive Feed

the only correct metal-cutting principle

comparison proves

- 1. Proper Design Based on nearly forty years experience in the art of metal cutting.
- 2. RACINE Machines meet accepted standards of the machine tool industry.
- 3. Easy to handle—Sin-gle lever control of all operating func-
 - 4. Hydraulic operation and control permits rugged construction
 —Economical production results.



ROPER application of the cutting tool is vitally important in sawing machines. That is why RACINE pioneered, many years ago, positive, progressive feed throughout the cutting stroke. This is still an exclusive RACINE feature.

Progressive Feed has these advantages. Undue strain is avoided. Each tooth is made to act like a parting tool. More metal is removed on each cutting stroke. That is the reason RACINE Machines cut faster and more accurately.

RACINE Hydraulic Machines incorporate a Dual (positive and flexible) Feed Control. Under positive feed the depth of cut is predetermined in every type of stock. Flexible feed enables the blade to cut faster in round stock and the lighter sections of tubing and shaped materials. Dual Feed is exclusively RACINE.

These scientifically accurate, fast cutting machines are available in four models and all capacities from 6" x 6" to 20" x 20". Write for catalog No. 12. At the same time outline the cutting work you have to do. Our engineers will recommend the best machine for the job.



RACINE "Variable Volume" Oil Pumps A Modern Source of Hydraulic Force

RACINE Oil Hydraulic Pumps in three capacities: 12, 20 and 30 G.P.M. provide from zero to full capacity without relief valves. They operate at pressures from 50 to 1000 lbs. P.S.I. Ask for catalog P-10-C.

RACINE TOOL AND MACHINE COMPANY Racine, Wisconsin, U. S. A. 1770 State St.





with this SEMI-AUTOMATIC GARDNER GRINDER

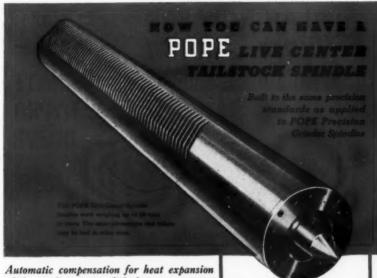
WHEN you need high production on flat surface parts of moderate size, this Gardner No. 122-20" Semi-automatic Grinder often provides the ideal answer to your problem.

For example, the shell parts seen above, are ground in this machine on a 15-station rotary carrier, at the rate of 20 TO 25 PIECES PER MINUTE. Parts are clamped and unclamped automatically, loaded by hand, but unloaded by gravity. Stock removal runs. 2005" to .008", and tolerances are .002" for parallelism, and .004" for size, or uniformity.



ASK FOR YOUR COPY OF OUR BULLETIN-"Gardner Flat Surface Grinders"

GARDNER MACHINE COMPANY
436 East Gardner Street · · · · · Beloit, Wisconsin, U.S.A.



of the work is accomplished in a new way

Expansion of the work from heat generated by the cutting tool often puts destructive loads on live center bearings unless provision is made to take care of these loads.

Without such provision the workman must loosen the center by hand to release the excess end pressure as best he can. Loosened too much the work may be spoiled; too little and the bearings may be spoiled.

The problem has been to provide compensation for this expansion without allowing any yielding of the center from its true axial position under load.

In the POPE Precision Compensating Live Center Spindle this problem has been solved. The operator has only to set up the work, adjust the center in his accustomed manner and then forget all about center troubles.

Ask us to tell you more about this new POPE Live Center Tailstock Spindle as it applies to your lathes.

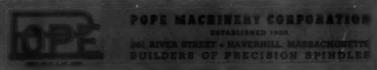
NO TE

HOW IT WORKS

In the POPE Compensating Live Center Tailstock Spindle the shaft is mounted on oversize precision antifriction bearings having abundant capacity to carry all radial loads involved.

The end thrust is taken on a separate set of preloaded thrust bearings of ample capacity yieldingly mounted in a manper to allow for work expansion without building up excessive pressure on the bearings.

The axial movement necessary to pro vide this compensation is accomplished without allowing any deviation from the accurate centering support provided by the radially preloaded MSF double row roller hearings. POPE Scaled Lubrication is employed throughout.





THE CINCINNATI PLANER CO.

MACHINE TOOL BLUE BOOK

THREE ACES TO DRAW TO



Wife can deal you a hand like their time plant!
Reach-Out U invent or Carbids in rinds will
prove to be it finest from anyone and any rind
will pay their way and prove
over on soil maintenance or product presinction.

No and advance features have given Anochy undergoing desiration in the Too Orinde field. It will be of operation and operator on evanience his type hear two prime factor in the single Root grinners. These, together with low faith a very one! Quick, any extragent tools family in the smallest size any extragent tools family in the smallest size to cutters to live inches in the star are made possible with Root designed in the star are made possible with Root designed in the star are made possible with Root designed in the star are made possible with Root designed in the star are made possible with Root designed in the star are made possible with Root designed in the star are made possible with Root designed in the star are made possible with Root designed in the star and the star are made possible with Root designed in the star and the star are made possible with Root designed in the star and the star are made possible with Root designed in the star and the star are made possible with Root designed in the

Correct mechine with maximum performance and operator convenience. K-O Engineers have made available more time performance and accessories than

pas envision of grinder manufacturer, thus making to the finders truly universal. Single-speed or the heads are svaliable. The K-O HEAD permits the operator nine speeds from which to select for the job at hand. These speeds range from 1,100 to 11,000 R.P. in the speeds range from 1,100 to 11,000 R.P. in the select for the job at hand. These speeds range from 1,100 to 11,000 R.P. in the select for the job at hand. These speeds range from 1,100 to 11,000 R.P. in the select for the se

Knock-Out Universal Tool Grinders are built to accommodate most any high-speed steel cutters as well as carbide tip tools. K-O Carbide Tool Grinders are built to handle all grinding and sharpening operations necessary on single point carbide tip tools or, if desired, for grinding chip breakers only.

Thinking men are now planning for reconversion. Let us tell you how to include these "three Aces" in your plans.

See your nearest Knock-Out Distributor or write now for catalogue No. 31-44



A HIGHLY DEVELOPED LINE...



MA 8-Eight speeds. 1200 to 12,000 R.P.M. Small work up to %". Built-in motor. Bench and column types, 1 to 6 spindles.



Type B-No. 1, No. 2, No. 3 sizes. Hand feed drilling units. Hand feed tapping units. Power feed drilling units,

MLY years of steady develor of can evolve the drilling equi-nt that is found in the Avey Lis

mends for greater united to the state of the

a spood Sensitive Drill-nes are built-in types and ape with varied needs. designed in capacities analiest drill gauge size imately 1 % inches.

g ball bearing three rate the highest spee retion. This feets

Ingineers will con

Individual Motors for each Spindle.

DRILLING MACHINE CO. CINCINNATI - OHIO



MA 6-Six speeds. No. 2 and No. 3 sizes. Built-in motors.



Belted quick speed change mochine. No. 2 size. Four speeds. Standard frame motors.

Cincinnati, Ohio, U. S. A.

THE AVEY DRILLING MACHINE CO. HCINNATI. OHIO



GRINDING OUTPUT ZOOMS 200%

THE one-two way to knock out grinding bottlenecks is to (1) put more zip in the operator's muscles with a lighter tool and (2) put more zip in the tool's RPM. For example:

This structural shop was using heavy, slow universal electric grinders for cleaning jobs such as shown in the picture. "How can we get more grinding output?" they asked the Rotor Application Engineer. He showed them with a Rotor High-Cycle Cone Grinder. These tools, operating at 10,800 RPM are now delivering the following goods in one-two style, plus bonus:

Greater ease for the operator because of less tool weight.

Greater speed under sustained load. Speed now drops only 4% compared to 45% formerly.

200% more grinding output hecause of the above two advantages.

Less outage time for repairs because of simplified design of Rotor High Cycle Grinders.

The Rotor Application Engineer might produce similar improvements in your portable tool operations if you'll just give hin, the green light.

Yours for the right tool,

HIGH CYCLE O'TOOL

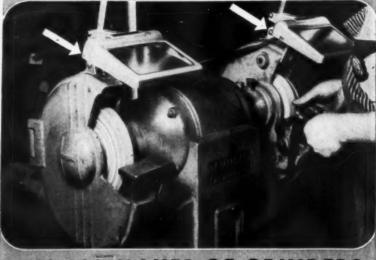
ROTOR TOOL

CLEVELAND OHIO

MGH

AIR

EYE-PROTECTION ...



ON ALL MAKES OF GRINDERS

Stanley "Flud-Lite" Eye Shields

Put Stanley "Flud-Lite" Eye Shields on all makes of grinders in your plant and you'll prevent workers' eye-strain and eye-injury.

With two light bulbs under a curved reflector, "Flud-Lite" Eye Shields furnish improved visibility, help keep production at a high peak.

The 4" x 6" safety glass in each "Flud-Lite" Eye Shield is backed by

ordinary window glass that is replaceable. Complete Eye Shield assembly is adjustable to suit operator — but cannot be shifted to non-guarding position — a real safety feature.

For positive, constant eye protection, ask your distributor for Stanley "Flud-Lite" Eye Shields or write for descriptive folder. Stanley Electric Tools, New Britain, Connecticut.



(STANLEY)

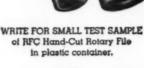
ELECTRIC TOOLS FOR INDUSTRY



The special Indurizing heat treatment now given all RFC Hand-Cut and Ground-From-The-Solid rotary files increases their hardness from Rockwell 67 Scale C to 75. This insures faster, cleaner cutting—and appreciably prolongs the effective life of the files.

All RFC rotary files now are "bottled" for shipment in individual plastic containers which afford the following plus values:

- Protection in shipping and handling
- Safe, convenient storage
- Visibility and ease in racking
- Quick identification
- Re-use of containers for many purposes



We fit the file to the job

THE ROTARY FILE CO., INC. STRATFORD, CONN.



Spot · Butt · Are WELDERS

Eisler resistance spot welders are available for all types of welding in ¼ to 300 KVA sizes. Write for catalog. Ask about our contract spot welding service.



35KVA. Air operated.
Slide Horn. Adjustable
Arms. Weld Timer and
Contractor. Excellent for
universal applications.

75KVA. Multiple Press Type. Air operated. Weld Timer and Contractor.



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Arc Welders



Butt Welders



AIR MOTOR OPERATED

Shot Welders



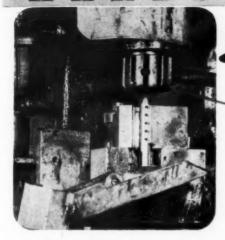
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Spot Welders

FOOT, AIR OR MOTOR OPERATED

ENGINEERING COMPANY

"HARDSTEEL"



Spinning Dies



Spin Ends Shut on Fuse Cases at the Rate of 120 Per Hour

The special properties of "HARDSTEEL"—extreme resistance to wear and heat—are used to good advantage in the high-speed production of fuse cases for artillery and anti-aircraft ammunition. Cases are made of Admiralty bronze tubing, 544" O. D. x .451" I. D. The operation is spinning one end completely shut on a .272" outside radius. This is done on a standard vertical spinning machine at 2000 R. P. M. spindle speed. Case is held by an air-operated holding fixture. No lubricant is used on die or work. Floor-to-floor time is 5 seconds per piece—2 seconds for spinning and 3 seconds for loading and unloading by hand.

The "HARDSTEEL" die averages 48 hours between grindsregrinding taking about 3 hours. Dies can be ground 15 times before becoming too thin.

"HARDSTEEL" Drills, Tool Bits and Special Tools are solving many other production problems—among them the drilling of hardened steels and the machining of tough hard steels and abrasive non-ferrous alloys. Also inquire about "HARDSTEEL" as a metal for special parts that must meet unusual conditions of service.

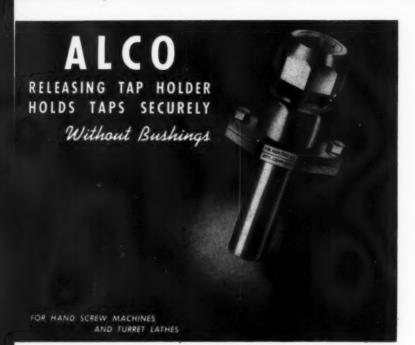
LEARN TO DRILL HARDENED STEELS WITHOUT ANNEALING

The "HARDSTEEL"
Operators' Manual is free, Write for your copy.



"HARDSTEEL'

DRILLS . TOOL BITS . EPECIALS



Make every minute count. Utilize your present manpower most efficiently for production of those war contracts and get set now for the post-war era when competition for civilian goods will be keen. As much as 50% of set-up time can be saved with ALCO Tools for the screw machine industry.

This Alco Releasing Tap Holder is built for accurate thread cutting exactly on centers. The patented construction of this tool holds the tap absolutely concentric with the work so that all leads of the tap carry the same load and cut the same size chip. This distribution of wear on the tap lengthens its life and prevents breakage usually caused by off-center tapping.

WRITE FOR NEW CATALOG NO. 6 Another outstanding feature of this tool is its rugged construction for performing heavy duty work and very exacting threads.

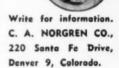
ALC COMPOS

THE ALCO TOOL CO., 252 Birdseye St., Bridgeport, Conn. 988 Stephenson BMg. Detroit, Ph. Mad. 58/6-688 & Dearborn St. Chicago, Ph. h.eb. 2868

THE QUICKEST WAY TO END AIR TOOL TROUBLES

NORGREN LUBRICATORS
COMPACT. SELF-CONTAINED

Inject just the right amount of oil fog into the air stream. Deposit protective film of oil on all moving parts. Lubricate for smooth, efficient performance. Prevent rust and corrosion when tool or cylinder is idle. Norgren Lubricators are air actuated and automatic, work only when tool works. Require no operator attention except to fill reservoir. Available with metal or transparent reservoir, 2 oz. to 5 gallons capacity. There's a size for every purpose.











"I installed Hoffman coolant filtration equipment to protect
and improve the quality of our precision finishing. I got an
unexpected dividend in big savings in maintenance, in
longer life for machines, cutting tools and grinding
wheels, and in reduced coolant costs. The system
paid for itself in a few months."

At right: Hoffman centralized installation for filtering coolant from a large number of machines. Other Hoffman models are available for individual machine tools.



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U.S. HOFFMAN

M A C H I N E R Y C O R P O R A T I O N 215 Lamson St. Syracuse, N.Y.

COOLANT FILTERS . FILTRATION ENGINEERING SERVICE

SAVE TIME . . . by FORM DRILLING

Now- FORM DRILLS DIRECT FROM YOUR PART PRINT!

CONNER form drills enable you to drill holes with irregular contours, such as flat bottom holes—holes with one or more tapers on the side—one or more radii in the form, or any other irregular shape. Also, CONNER standardized practice entirely eliminates the cost of design. We work directly from your part print.

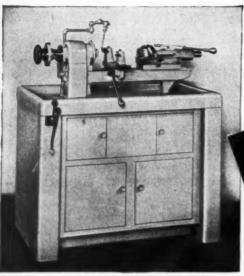


FOR DRILLING LARGE SIZE HOLES

Write for literature on CONNER'S MULTI-TIP drill equipment for form drilling—on CONNER'S special drilling applications—on CONNER'S MULTI-TIP drills for general use,

Conner tool & cutter co.

5555 CONNER AVE. DETROIT 13, MICH.



PRECISION
HAND
SCREW MACHINE
UNITS

You Can Speed Production and Reduce Costs On Precision Screw Machine Work With These Efficient Wade Units



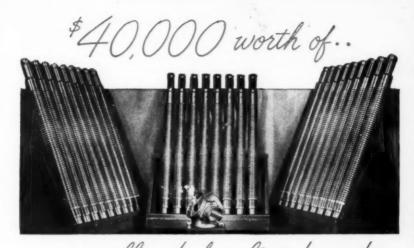
Bench Lathes and Profilers For Precision, Versatility And Stamina You can do more work at a lower cost with Wade Standard Precision Hand Screw Machine Units for they are built especially for precision production operations. They are soundly designed and built to turn out extremely accurate work.

Some of the features of the Wade Standard Precision Screw Machine Unit are: Headstock has double row roller bearing. Lever Closer runs on ball bearing; operates positively to open or close collet with instant movement. Double Cross Slide movement 23/4"; provided with adjustable stops. Automatic Turret Attachment; Tilted self-clamping 6-station head; takes 3/4" shank tools; Adjustable stops index automatically. Turret working travel 3/4"; indexing travel 1"; total 4/4". Unit has 32" bed. Collet cap: Model #5, 3/4"; #7, 1". Weight, with steel cabinet, 650 lbs.

· Write For Bulletins

THE WADE TOOL COMPANY

WALTHAM 54. MASSACHUSETTS



ropeller hub spline broaches delivered in one shipment by U.S. BROACH

MEETING ALL THE EXACTING SPECIFICATIONS OF THE AIRCRAFT INDUSTRY

U. S. Broaches have played an increasingly important part in many of the industries that had to meet the refinements of limits and finish required by government specifications.

This has been particularly true of the aircraft industry where precision is the watchword.

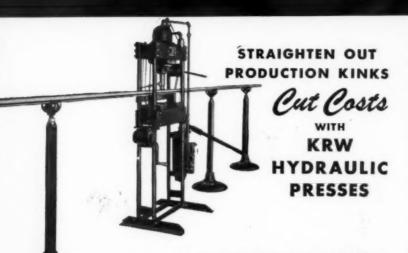
Broaching has not only proven ideal for aircraft manufacture, but it has been the answer to many other industries' problems where precision manufacturing is required.

For Example: a large printing machinery company, who is now producing precision parts for aircraft gears and gun sights, has discovered that broaching provides greater accuracy, flexibility and convenience of operation. This has resulted in reduced labor hours per unit of output, low machine cost, simplicity of design, long tool life and economy. The last factor being of particular importance in the highly competitive markets when they again can manufacture printing presses.

Perhaps you, too, may want to learn about ways to reduce your production costs-a letter sent today outlining your problems will receive prompt attention from our engineering department.

ST E SEVEN MILE ROAD

DETROIT 12, MICH



This KRW Hydraulic Arbor Press was specially adapted for straightening propeller shafts of great length. On this particular unit a Specil-booster was not deemed necessary to the operation. Perhaps a variant of this unit will fit into your production planning.

75-ton KRW Press equipped with patented Speedi-Booster



Literally hundreds of adaptations of the standard KRW Hydraulic Arbor Press...

WAR-PROVEN ADVANTAGES OF LOW-COST KRW PRESSES ARE NOW BEING ADAPTED TO PEACETIME PRODUCTION SCHEDULES

in a great many industries...have definitely proven the many savings that acerue from the use of these highly versatile presses. In a great many cases, special KRW Presses have replaced

Standard KRW Hydraulic Presses are made in 25, 50, 60 and 75-ton capacities. For special applications, these presses can be engineered to solve a specific problem... either hand operated, air-oil, electric-oil operation or in any combination. This equipment is so flexible that we have been able to design, build and ship special presses in a matter of weeks. Bring your special problems to us. We have the experience and facilities to give you fast action. Write for our Hydraulic Press Bulletin. K. R. Wilson, Dept. 13, 215 Main St., Buffalo 3, N. Y.

heavier, outmoded equipment at a fraction of the cost.



K. R. WILSON



MILLIONTHS OF AN INCH FOR SALE BY VINCO

VINCO CORPORATION, BETT SCHAEFER HIGHWAY, DETROIT 27, MICHIGAN: SALES OFFICES, NEW YORK, CHICAGO, CLEVELAND

Sami-Antomotic Hydroulic Spline and Gren Grinder + Optical Maste Inspection Diciding Hand + Invalute Checket + Angle Tangert to Redict Dresser

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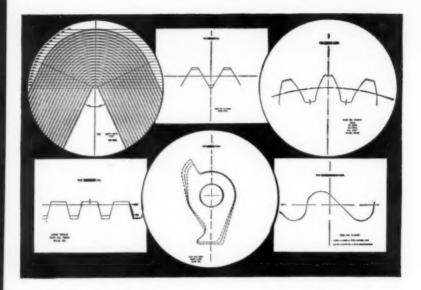
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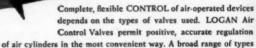
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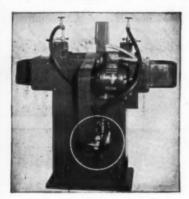


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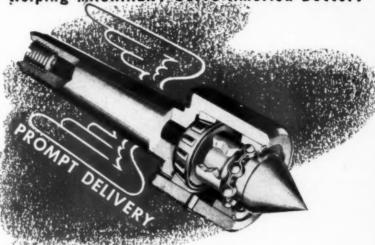


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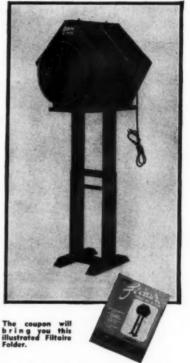
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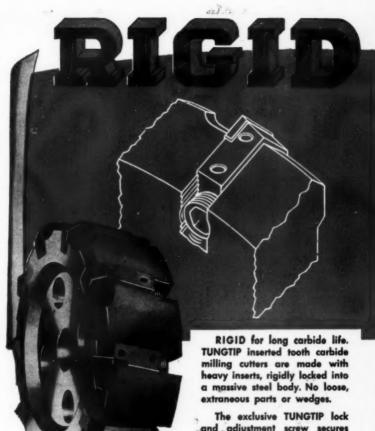


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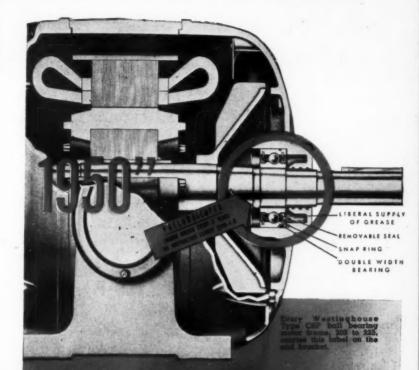
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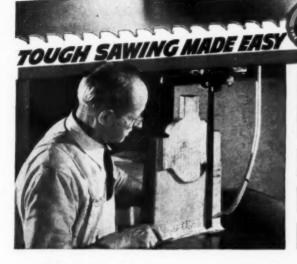
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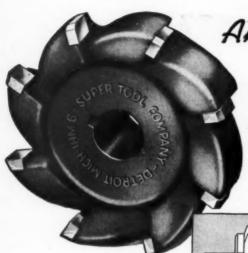


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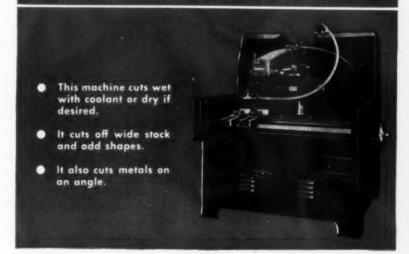
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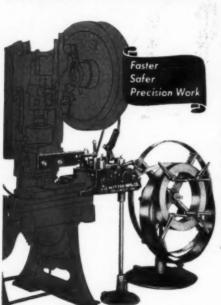
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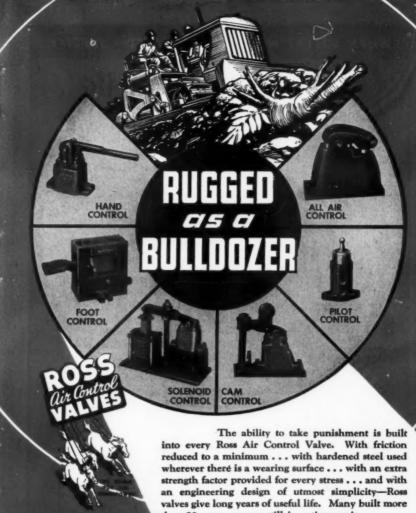
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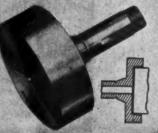
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Below: Shank and tip with preplaced EASY-FLO No. 3, being brazed by induction heating automatically contralled.



Right: Shank and tip with propioced EASY-FLO No. 3 being brosed by gas-air



him concentrate on proper

heating.

Above: Shork and tip acsembled for furnace brazing with EASY-FLO No. 3 strip stack cut to fit and preplaced.



Manufacturers throughout the country are joining cemented carbide tips to tool shanks by brozing with the low temperature silver alloy EASY-FLO No. 3, and leading tip manufacturers recommend this method.

The principal reasons are these — the EASY-FLO No. 3 method is simple — it is fast — it gives "one-piece" strength — it is thoroughly reliable — it is low in cost.

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GET FULL DETAILS IN BULLETIN 11-A

This bulletin gives you the EASY-FLO No. 3 tool tip brazing procedure in an easy-to-follow step-by-step description, including oxyacetylene torch, furnace, gas-air burner and induction heating methods. It also covers the brazing of high speed steel tips with EASY-FLO. Write for your copy of Bulletin 11-A—today.

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A slight movement of the contact point (A) is amplified ten times by the balanced levers (B) and (C) to record on the indicator at (D). Dial reads in tenthousandths and has a range of .030".

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BLUE BOOK

Presents ...

CARBIDE TOOLING in most cases offers a promising method of stepping up production. However, a great deal more is involved than the mere installation of carbide tools. For satisfactory results the machines must be in good operating condition. Jigs and in good operating condition. Jigs and fixtures must be rigid. Provision should be made for more rapid handling of workpieces. The correct use of carbide tools will pay worth-while dividends in higher production rates, better surface finish etc.

In the current section VI in the series of Carbide Tool articles, additional problems in conversion are discussed. Feed charts are included for various machines. Some popular types of milling cutters are introduced and their operating characteristics are

TEE SLOTS and Tee bolts are familiar items to most shop men. H. F. Williams presents some new angles in the story commencing on page....181

WELDING terminology and the various methods of welding are discussed in this first of a series of articles by C. H. Jennings, Welding Engineer, Westinghouse Research Laboratories. See page

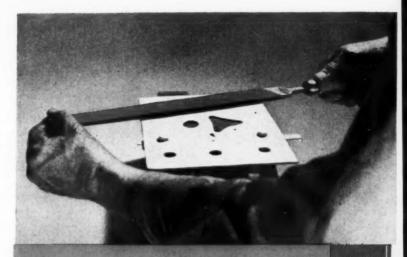
PROMOTION and matters related thereto are analyzed by Ed Motters-head in the Foremanship story commencing on page......227

INCENTIVE TAXATION is Arthur Roberts' topic in his current contribution to the series of tax articles, beginning on page......249

"LET'S TALK SHOP"-page......263

"WHAT'S NEW"-page...........298

MECHANICS Thru the Ages-page. 410



Smooth-filing Stainless Steel

The remarkable thing about filing stainless steel is that there is a file that is able to stand up at all against this hard, tough metal.

But Nicholson has done it with a distinctive file-tooth design. This feature and great care in hardening give Nicholson Files for Stainless Steel special virtues for long-lasting efficiency despite the abrasive action of the hard chromium and nickel content they encounter.

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A BOOKKEEPING emergency will hit this country on V-E Day warns the National Ass'n of Mfrs. If fumbled, it may throw the industrial front into sufficient confusion to hold up civilian jobs for a considerable number of workers. The estimate of a 20% shift from munitions to civilian goods during the first 3 months after V-E Day can mean termination of some 20,000 prime contracts and 400,000 sub-contracts. During the ensuing six months the number may be boosted at least 50%.

Some of the larger companies have personnel specializing in war contract termination. They know the details.

Such is not the case among holders of some 2,000,000 sub-contracts—and a huge section of civilian employment is provided by small sub-contracting establishments.

Government services have organized training programs for contractors, under which more than 20 teams of contract settlement experts are being sent to major industrial areas to conduct training courses in contract termination.

In addition, termination coordination committees have now been established by government agencies in 21 districts to assist war contractors in preparing for V-E Day.

Contractors, if they haven't already done so, should explore pretermination agreements. Details may be obtained from contracting agencies.

The procedure is relatively simple. A contractor and the procurement agency work out terms of settlement during life of the contract. Then if the order is cancelled, the settlement work is already accomplished.

Stop-work points are established in the basic method. The contractor agrees on amounts he will accept at various stages of completion.

In some cases the contractor will be unable to estimate his costs even within rough limits so pretermination agreements may not be feasible.

Where it can be worked out, the advantages are obvious for it avoids competition with a lot of other cancelled contracts which may involve long waits for settlement.

A new educational program is designed to bring contractors up-to-date on the latest procedures, principles of cost determination and cost allowances. Meetings will be held in various sections. At these it should be possible to obtain the answers to most of the termination problems. It is advisable to watch for announcements of these meetings and arrange to attend them.

Wesley G. Paulson

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Testing Hardness of a Headstock Spindle Bearing Surface





The "built-in" precision of South Bend Lathes, so evident in their performance, has its source not only in their design features, but in every vital part. Each part has behind it the experience of thirty-eight years of lathe building, plus constant research directed towards its improvement. Backing this up in every manufacturing process are rigid controls that prevent deviations from established standards. These are a few of the reasons why South

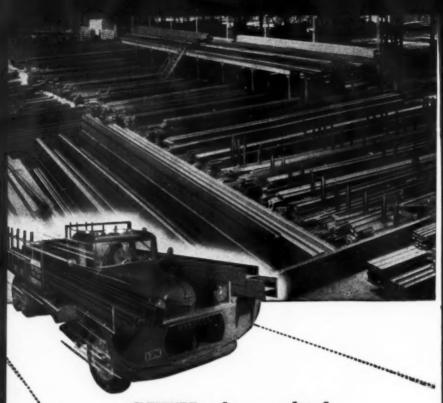
Bend Lathes are better today in every way.

This "built-in" precision makes possible heavier cuts and feeds, easier operation, longer life, and greater accuracy. It pays dividends to the users of these lathes in better and faster machining. Examine your metal working requirements in view of the advantages that can be obtained through the use of South Bend Lathes. Write for new, full color catalog, No. 100-D.



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RYERSON STEEL



PART VI-CONVERTING TO CARBIDE TOOLING

Continued here is a discussion of the steps involved in conversion to carbide tooling. Following the procedures recommended will result in a better understanding of the requirements of modern carbide tooling—and the improved performance attainable thereby. In making this helpful data available to the metalworking industry, the Technical Department of Wesson Tool Co., Detroit is performing a real service. (Editor)

Surface Foot Rates

S URFACE foot rates in carbide steel milling are considerably higher than those used with high speed steel cutters. The present practice employs ranges from 350 to 750 feet per minute. This compares with the range of 50 to 100 for high speed steel. The surface foot rates are varied to suit the material in the workpiece. Generally speaking, the higher rates are applied to the lower (or softer) hardness steels, while the lower rates are applied to the higher hardness steels. This hardness is usually measured in Brinell numbers. To be more specific, these recommendations can be made, based on actual experience or experimental data:

Cutting Speed, fpm.
750
625
560
500
450
400
350

Revolutions per Minute

Once the proper surface foot rate (sfm) has been chosen, with the diameter of the cutter determined by the nature of the

operation, the rpm of the cutter (or spin-dle) is calculated thus:

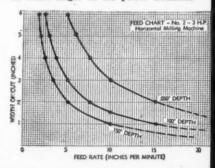
$$rpm = \frac{Surface Feet Per minute (sfm)}{\frac{Dia. of Cutter}{12} \times 3.14}$$

Examples

1—afm (chosen from preceding table) is 600
Cutter diameter is 8"
$$rpm = \frac{625}{8/12 \times 3.14} = 300$$

Calculating Feeds

Using the proper chip load, or the thickness of the chip removed by each tooth, is an important factor for good results in carbide steel milling. The chip load should never be less than .005" and as much larger as the power available





FOR INSIDE BORING FOR OUTSIDE TURNING AND BURNISHING OF BAR STOCK

The new White Box Mill will increase production in turning, boring and burnishing of bar stock. It is extremely accurate and has no moving parts. Circular tools on the face can be ground and reground as much as 300 to 500 times assuring long tool life.

The White Box Mill is ruggedly constructed and will handle heavy cuts and feeds in sizes from 1/16 to 3/4 inches with fast setups and adjustments. Quick

Distributors wanted, write for particulars.

GEO. W. WHITE P. O. BOX 369 RAVENNA, OHIO

will permit. The customary range, using standard milling machine equipment, is .005" to .010".

The number of teeth in a cutter employed in carbide steel milling, generally speaking, is fewer than when the traditional technique is used. To design the ideal cutter for a particular operation, the number of teeth can be calculated exactly in this way:

Since-HP = K x D x W x T x CL x R.P.M.

Where- HP = Horsepower

K = Factor (cubic inches per HP) 1 can be taken as a satisfactory average

D = Depth of cut T = Number of teeth

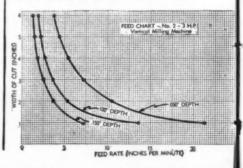
CL = Chip Load RPM = Revolutions per minute

Then-HP

T Kx D x W x CL x RPM.

However, this theoretical determination of the number of teeth is hardly practical for a cutter to be used in numerous operations as may be necessary in the case of most organizations. From the experience available to date, the number of teeth in a cutter suitable for a wide range of milling operations may be determined by a sort of "rule-of-thumb" thus:- Number of teeth equals diameter of cutter in inches plus two. According to this, a 4" cutter has 6 teeth, a 6" cutter 8 teeth, etc. This tooth pitch has been found quite satisfactory considering the somewhat limited experience in carbide steel milling to date. Some applications, on the other hand, use D as equal to the number of teeth.

The three factors contributing to the feed, viz., chip load, number of teeth and





Because the one-piece construction assures the utmost in efficiency and accuracy of operation. That is why LeBlond Lathes are equipped with one-piece, double-wall aprons. Between these double walls the rack-pinion, the rack-wheel and the hand-wheel stud are mounted from the inner side on anti-friction bearings . . . no bolted-on brackets or supports to work loose. This rigid construction maintains accurate alignment under the excessive strains of high speeds and heavy cuts. At the same time, it assures both easy movement in operation and unit compactness. It is lubricated by a positive "one shot" oiling system. The one-piece apron is another outstanding LeBlond feature.



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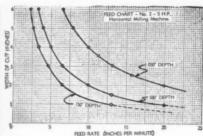
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rpm can thus be determined for any particular operation.

The feed rate is the product of the chip load, the number of teeth and the rpm. This can be expressed:

(Feed Rate) IPM (Inches per Minute) = Chip Load x Number of Teeth x RPM.

These examples may assist in calculating the feed rate:

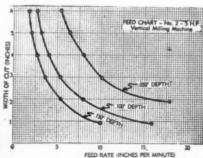
1-A 4" diameter cutter having 6 teeth is to be used on material that Brinells at 200. Here the choice of the proper surface foot rate is, according to the table, 560. From this, the rpm of the spindle is determined in this way, using the formula already cited:

$$\frac{560}{3.14 \times 4} = 540$$

12

From this the feed rate can then be determined, using an arbitrary chip load of

IPM = .008 x 6 x 600 = 29"





1 — Strap both mold halves together in an upright position on machine table and mill "Eat" and "Mouth" sections complete.

2-Mill elongated sections for core guide.

3-Position mold blocks on machine table as illustrated, lay out and mill handle grip section complete.

4-Mill core guide and recesses to form small pass at the "Mouth" end of molded part.

5-Mount core holding plate in vise and mill 3 recesses.

Total machining time - 90 bours.

Check these advantages of the Milwaukee 2D Rotary Head Milling Machine and how you can benefit from them in your own shop:

DIRECT . . . mills mold cavities in a single setup without the aid of templets or models, transmitting blueprint dimensions and outlines direct ly to the workpiece.

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No adjustments required for tap sizes.

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Taps right or left hand without adjustment.

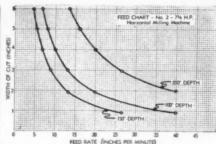
Machine may be used for drilling, reaming, counterboring, etc. without adjustment.

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2—A 10" diameter having 12 teeth is chosen for the milling of material that Brinells at 350. The choice of surface foot rate in this instance is 400. With this data, the rpm of the spindle is determined thusly, using the formula already given:

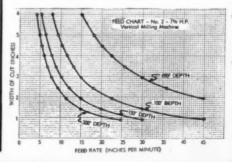
$$\frac{400}{10 \times 3.14} = 150$$

From this the feed rate can then be determined, supposing an arbitrary chip load of .007" is selected for the operation:

Selecting the Machine

The amount of metal removed by a milling machine in one minute per hp is a factor that is of interest, not only to the engineer and production manager, but also to the operator.

This factor, referred to as "K" factor, is the ratio between the number of cubic inches of metal removed each minute by one hp. Sometimes it is expressed in re-



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machinery and conserved skilled workmen by

profile milling this radius of an engine crank-

shaft section on the Gorion Duplicator. Semiskilled help operated this machine, obtaining

smooth finish on the profiling of the irregular channel contour (1) on the part shown at

right, and the milling of the channel (2) below

The Duplicator was set up with a special

The Gorton Duplicator is the ideal machine for handling jobs like this where uniformity in quality and high precision repetition of all

master in order to eliminate changing tools or reserving the work. A special fixture was used to hold the work at an angle to allow cutter

dimensions is required.

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access in milling the channel.











George Garton Machine Co., 14)5 Racine St., Racine, Wis Soud me these free hi

TEAR OF COUPON AND





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A few examples of work positioning are listed here, as reported by LYON-Raymond customers, of keeping work convenient for the operator by the quick elevation and lowering of this Hydraulic Elevating Table.

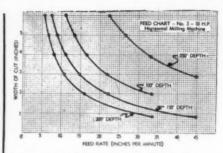
- Positioned for easy transferring of die in and out of press.
- 2. Transfers work from one level to another—height positioning.
- 3. Feeding sheets to shear or press.
- Adjustable support for overhanging work.
- As a work table it positions work at right height for all workmen.
- 6. As a low priced Welding Posi-
- Loading or unloading motor trucks.



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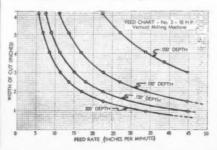
Several Optional Features Available. Deliveries from stock on Standard Models.

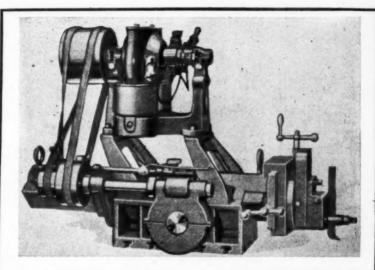
LYON-Raymond CORPORATION 423 Modison St. GREENE, N. Y.



verse as the hp required to remove one cubic inch of metal. Either way is acceptable, but in this presentation we will confine ourselves to its use as the ratio of the cubic inches per minute per hp as the "K" factor. This can be expressed also as the amount of metal removed in terms of cubic inches per minute for or by one hp.

The number of cubic inches of metal removed per minute can be determined easily by multiplying the width of the cut by its depth, and this in turn by the inches per minute feed rate. Thus if a 4" workpiece face is being milled to a depth of .250", it is obvious that one square inch in cross-section of metal is being removed. If this removal is at the rate of 15" per minute, then the number of cubic inches per minute will be equal to 4" x .250" x 15, or 15. If the "K" factor were one, then it would require 15 hp to remove this 15 cubic inches of metal per minute. The "K" factor, for quick calculation, is frequently assumed to be one when milling steel. As a matter of fact, it varies from .65 cubic inches per minute





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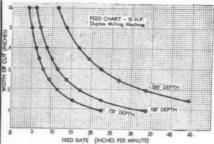
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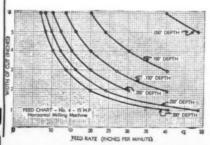
611-620 Empire Bldg., Pittsburgh 22, Pa.

Miners of Job Tested and Job Proven Tools



to 1.2 cubic inches per minute of metal removed per hp. But, as already stated, for quick calculation and for every-day shop purposes, it is quite safe to assume that the ordinary milling machine, in fairly good shape, will remove one cubic inch of metal per minute per hp.

As just indicated, this factor varies not only with the type of machine, but its condition as well. The "K" factor for a horizontal machine may be different from that of a vertical machine; likewise for bed-type machines. Above all, the "K" factor varies considerably with the operating or running condition of the equipment. Thus an old machine that has been in use many years, but which has been properly maintained and conditioned will generally show a fairly good "K" factor, or rate of metal removal per hp. On the other hand, a new machine that has been abused, not properly conditioned, and with adjustments that are sadly in need of correction, will show a relatively low



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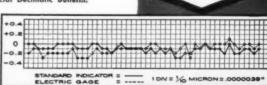
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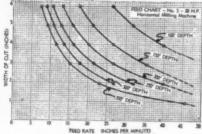
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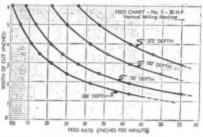


power factor. In other words, the rate at which a machine can remove metal per hp will depend, very considerably, upon its condition.

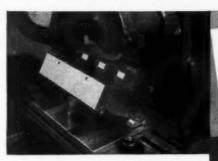
For every-day shop purposes, obviously it is impossible to take time out to calculate the "K" factor or to determine the rate at which metal can be removed in a particular job on a given machine. This must be done in some other, much more rapid fashion.

For this reason, the accompanying 13

charts have been prepared. It will be noted that these curves are plotted with the width of the cut in inches as vertical values, while the feed rate inches per minute are set down as horizontal values. Moreover, each curve represents a definite depth of cut. Thus the feed chart for a 15 hp milling machine permits us to determine the feed rate, knowing the width of the cut in inches and the depth of the cut in inches. Thus from the chart, a 2" wide cut and 250 deep can be taken







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May, 1945

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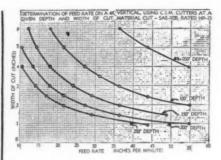


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at approximately 24" per minute, under these conditions using all of the available 15 hp in the machine. Every point on every curve in this chart represents an expenditure of 15 hp.

The feed charts that follow are based on a given rated hp in a machine, the width of the cut and the feed rate, which if taken for a given depth will load the machine to its rated capacity.

Thus the chart for the No. 2 Milling Machine, rated at five hp can be loaded to this power by referring to the chart thusly:

If the work piece width is 3" and the depth of cut is .150", then the feed rate on this machine can be set at approximately 7" per minute. Under such conditions, the power consumed by the cut will be five hp. Every point on the three curves presented in this graph—as also for every

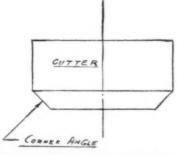


Fig. 1-This 15° corner angle of cutter generally gives best cutter life.



Here is a truly remarkable Hand Blade . . . One that has received complete acceptance with all who have tried it on hand blade metal cutting.

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May be used under all awkward sawing conditions, or by inexperienced men, with complete satisfaction and fast cutting speed. Sharp twists and kinks, which are the main reason for saw breakage, are absorbed without damaging this HACKMASTER Blade.

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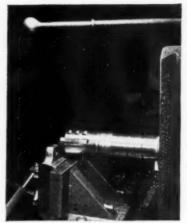


Fig. 2—Here a single point tool is employed as a fly cutter.

other graph—will provide the machine setting for maximum or rated load of that machine.

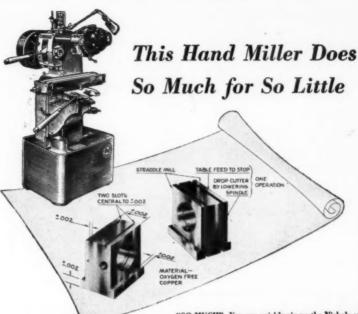
A graph is provided for each size and number of machine. Likewise, each graph contains a curve for .050" depth cut, .100" depth cut and .150" depth cut. In some instances a curve for .200" depth cut is also provided. This is true of the larger machines.

These curves permit operation of a machine regardless of cutter, number of teeth, or other factor at exactly the rated capacity of the machine, providing the width and depth of cut are used as controlling factors.

TYPES OF CUTTERS

This discussion of carbide steel milling cutters deals not only with the design but also their proper use.

As indicated previously, carbide steel milling cutters are of coarser pitch than those used in the traditional technique. Moreover, the cutting angles often are negative as shown in the discussion dealing with this phase of the subject. The angles are correctly referred to as radial rake and axial rake. The customary angles for general milling purposes are 7° negative radial rake and 7° negative axial rake.



"SO MUCH"—You can quickly rig up the Nichols and put it to work on production or experimental runs, easily change it over from one job to the next and put it through a wide range of milling, boring, turning and facing operations to tolerances in "tenths". The counterbalanced rise-and-fall spindle makes possible the use of simple fixtures. And the addition of lever, rack and pinion transverse feed, an exclusive Nichols feature, enables work to be chucked lathe fashion on the spindle with tools mounted on the table or vice-versa. As a result, the Nichols Miller often does the work of heavier, costlier millers, lathes, boring machines or grinders...more economically.

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Fig. 3—This step mill represents an evolution of the fly cutter.

Fig. 1 indicates the angle that is correctly called the corner angle. A 15° angle on the corner of the cutter as indicated in this illustration generally results in the best cutter life. Any other corner angle whether 0°, 10°, 30°, or 45°

results in fewer passes or a smaller number of cubic inches removed.

Fly Cutter

Fig. 2 indicates the use of a single point



Fig. 4-Four cutters are used in this very effective step mill.



Old drills with their twisted or broken tangs are made like new with NU-TANGS. They eliminate the necessity of welding and use of inaccurate sleeves. Reconditioning your drills with NU-TANGS is simple and easy. Do it right in your own shop. Complete instruc-

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PUTNAM TOOL COMPANY

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Detroit 7. Michigan



Fig. 5-A step mill is used to advantage in this set-up.

tool employed as a fly cutter in a milling machine. The angles of this cutting edge are 7° negative radial rake and 7° negative axial rake.

This method of milling with carbidetipped single point tools, known as fly cutters is recommended, for example, as a beginning in this technique. It is also advisable for certain operations of a peculiar character. Simple face milling operations thus can be performed and, while the feed rate will not be overly high, this method of milling will serve to introduce the technique in an organization and also as an educational means for



Fig. 6—This 8" face mill has wedged solid carbide blades.

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tunities to improve production control are opened up by Wizard Electric Counters. Wizards count anything that will actuate a switch, relay or photoelectric unit. They may be installed at any distance from the actual source of count. They can be centrally located

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the operating personnel. The statistics given in an accompanying tabulation concerning the operation shown in Fig. 2 are typical of this method and may be of interest.

rpm—355 Feed—2%"

Material-SAE 4130

Sfm-276

Chip Load—.007"
Brinell—400—Machine—No. 2

Step Mill

The step mill illustrated in Figures 3 and 4 represents an evolution of the fly cutter. In effect, it is a combination of two or more fly cutters set on different levels and, hence, its feed rate is limited to that of a fly cutter or single point tool. Fig. 5 shows such a cutter in operation and the accompanying data will serve to illustrate the use of this cutter.

Rpm—518
Feed—5½"
Material—SAE 4640
Sfm—407
Chip Load—.010"
Brinell—210—Machine—No. 5



Fig. 7-The face mill shown in Fig. 6 is used in this operation.

It should be noted the step mill bits can be set so that the last step performs a finishing operation while the others do the roughing. Thus, if .125" of material is to be removed, the last step can be set for .025" while the remaining .100"

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Write for Bulletin WP-22
CULLEN-FRIESTEDT CO.
1321 South Kilbourn Avenue, Chicago 23, III.



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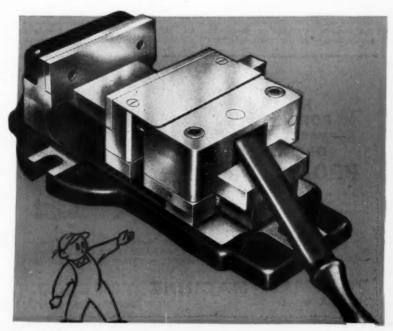




Fig. 8-Here center of cutter is offset from center of work.

can be divided among the other steps. It is customary to have three steps in a 2" and 3" cutter, four steps in a 4" and 5" cutter.

Both the fly cutter and the step mill are commended as beginning operations in carbide steel milling by means of which an organization can acquaint its personnel with this revolutionary method.

The fly cutter should be considered for such operations and on work pieces where high pressures cannot be tolerated. Thus, when the work piece is made up of thin cross-sections and where distortion would result from the usually heavy cutting pressures associated with milling, then the fly cutter can be used.

Moreover, this single point tool finds ready application in the milling of cores for dies and molds where it would be impossible or difficult to use the standard face or other milling cutters.

Step mills have a wide field of application where the machine tool is limited in its power range. Thus for the three and five hp machines, it is frequently advisable to limit the feed rate to the point where a fly cutter, such as discussed, would be most practical. Moreover, the step mills, as shown in illustrations 3, 4 and 5 are used for taking cuts as deep as 34". This is impractical, or nearly so, with the standard type of face mill. Thus the step mill has a sufficient number of applications to justify its serious considera-

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simplicity, operation is fast, easy and reliable. Meets Ordnance Department specifications and hundreds are now in use. The full price is only \$175.00 and deliveries are excellent. No priority is required - write or wire for circular.

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tion by any organization contemplating conversion to carbide for milling.

Face Mill

The 8" diameter face mill shown in Fig. 6 has 12 solid carbide-wedged blades as is evident on examination. This cutter is used for face milling operations either of single or duplex type. The latter is shown in Fig. 7. The data for this operation indicates the increased rate of feed posible with a multi-tooth cutter. The rpm is 200, which is equivalent to 418 surface

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feet. A chip load of .0129" was chosen for this milling operation since power is available in the form of two 7½ hp motors, one on each spindle. With 10 teeth the feed rate is equal to:

.0129" x 12 x 200 = 31" per minute (IPM.) In performing a face milling operation as described, whether using a fly cutter, a step or face mill, the ratio of the diameter of the cutter to the width of the work piece face is important. This ratio should never be less than five to three. If a 5" cutter were used on a 4" or 5" work piece instead of 3" as indicated by this recommendation, the result would be at least a partial failure as regards cutter life, finish and number of passes.

Fig. 8 presents visually another recommendation, namely off-setting the center of the cutter from the center of the work piece. This serves to increase the cutter life and the amount of metal removed by bettering the cutting action.

TRIPLE-CHIP METHOD

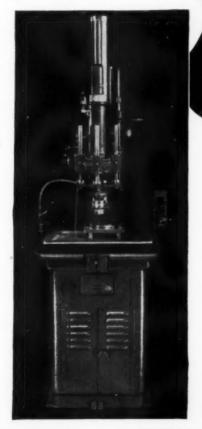
A very attractive 60-page manual on the Cold Sawing of Metals by the Triple-Chip Method has been issued by the Motch & Merryweather Machinery Co., 718 Penton Bldg., Cleveland 13. A brief history is included tracing the development of cutting-off techniques and describing the triple-chip method. Performance data is given on different types of jobs. Details of the Motch and Merryweather machines are included. An interesting feature is the illustrated presentation of case histories with performance data. Tables and specifications are shown on saw blade speeds along with capacity charts for the different machines and general specifications. The manual has an attractive plastic binding which permits opening flat and the book is interesting as well as exceedingly informative.

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Carbide Shells Stop Nazi Tanks

C OINCIDENT with the awarding of a \$6,000,000 Army Ordnance contract for the construction of additional plant facilities by the Ordnance Division of Carboloy Co., Inc., Detroit, the veil of secrecy has been lifted in connection with an anti-tank weapon which has been in use by U. S. Armed Forces overseas since the St. Lô break-thru last summer.

Altho it has been reported for some time that the Army was employing a new type of armor piercing projectile for tank and anti-tank guns, details up to now have been withheld for security reasons.

The new projectile which has been so effective in combating the German Panther, Tiger and Royal Tiger tanks obtains its vastly higher armor-piercing ability from two factors:—(1) the use of extremely hard and tough tungsten carbide instead of steel for the armor piercing core, and (2) much lighter total weight for the projectile. The latter factor is important since it permits a given gun to fire the projectile with a much higher velocity.

Actually, the combat effectiveness of the new projectiles is even greater than is indicated by the greater armor piercing ability. This is due to higher accuracy, traceable in large part to the higher velocity and shorter flight time. With the new projectile it is possible to hit tanks in motion with much greater ease than formerly, while stationary objectives can be



At left, one of the new armor piercing projectiles complete with aluminum body and nose. At right, body and nose removed showing the tungsten carbide armor piercing core.



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hit with fewer misses even at long ranges. According to reports from the front, German tanks have been stopped with just a single shot at ranges up to 3000 yards.



Looking down the Carboloy production line, where the new armor piercing projectiles made of tungsten carbide have been produced since last summer.

Actually the new weapon is a projectile within a projectile. Inside the assembly is a core of the hardest metal yet made by man - cemented tungsten carbide weighing several pounds. This core is centered in a housing made mainly of aluminum. The prime function of the outer body is to streamline the shell and permit a smaller diameter armor-piercing core to be fired from a larger bore gun. For the 76 mm gun, for instance, roughly half the weight is contained in the core, the total projectile weight being around 9 lbs, compared with roughly 15 lbs for conventional steel armor piercing projectiles. As a result, muzzle velocity of the projectile is around 3400 ft per sec, compared with 2800 ft per second.

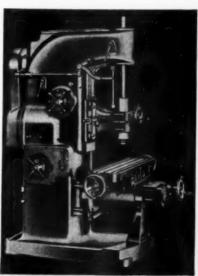
The aluminum windshield body and steel base of the projectile perform no major function in actual penetration of



While capable of handling a wide range of ordinary, plain milling and boring, Knight Millers can turn out quickly and accurately, without special equipment, a wide range of difficult and unusual parts. They have capabilities, not found in other vertical millers, which simplify many otherwise difficult set-ups.

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armor. The armor piercing ability of the new projectile is therefore further increased by having its energy largely concentrated in the smaller diameter tungsten carbide core. Further, the extreme hardness of the carbide prevents it being 'flattened out' on impact. Being both vastly harder and heavier than armor plate, it penetrates the plate more easily than could a steel core. Specimens recovered show the nose of the carbide core

to be virtually unmarked after having passed thru several inches of armor plate. After penetration, the core breaks up into lethal pieces, scattering in all directions, inside the enemy tank, often also setting fire to the tank.



Of interest is the fact that the cores, which are made of the hardest metal yet produced by man, are handled in process in wooden "boats" lined with sponge rubber to protect them before they are hardened.

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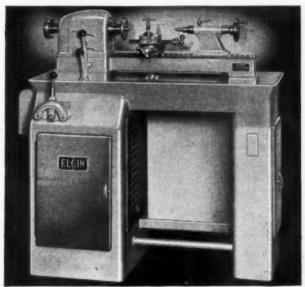
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in speeding production, first, of our own war materiel, it was not until the inception of the European campaign that it was used in the form of projectiles by U. S. Armed Forces,

In this respect it may be remembered that it was this same metal—tungsten carbide—which helped so much in speeding tank production by enabling the machining of armor plate with far greater ease than is possible with steel tools. Thus the metal which helped to build U. S. tanks is now also being used to destroy enemy tanks,

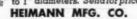
Ability to release this material for projectiles last summer proved a major asset since one of the most important weapons on which the Axis forces relied in the French and Rhine-Land campaigns was its new "Tiger" series of tanks with their heavier armor which is vastly more difficult to penetrate. The new high velocity armor piercing shot with its tungsten carbide core has proven an effective weapon with which to defeat these tanks.



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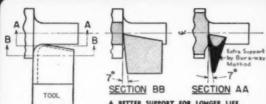
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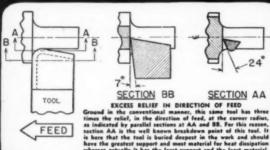


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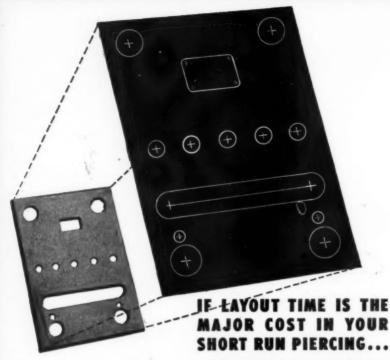


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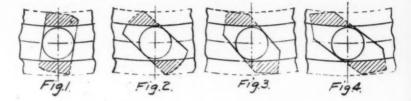
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Tee-Slots and Tee-Bolts

By H.F. WILLIAMS

W HEN tee-slots are machined longitudinally or crosswise in a square or rectangular table or surface plate, there is no loss of bearing surface for the upper face of the bolt head where it contacts the upper surface of the tee-slot. In most instances, except in dead-end slots, the bolt can be slid in from either end. But when, however, the tee-slot is

circular, and the square head of the bolt must be assembled from the top, a large enough hole must be provided to accommodate diagonal corners of the bolt head. This results in the loss of bearing surface or clamping contact area in which a full 360° of contact is not possible. A dead spot is produced in the otherwise continuous tee-slot.



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There are several ways to avoid this predicament. The first method is to cut down the square head of the bolt to a width equal to the diameter of the bolt as shown in Fig. 1. The two cuts are taken parallel to two sides so that the final piece has a length of head equal to the original size of the square and a width the same as the diameter of the bolt. It enters the tee-slot perpendicular to the position shown and when tightening the nut, the head turns until the opposite corners hit the side walls of the tee-slot. In order to turn the head the two sides. as can be seen in the sketch, must be milled off on a circle or ground angularly to allow partial rotation. Regardless of whether the slot is straight or circular. this is a common design for use with fixtures that cannot be slid to the ends of the table for removal of the bolts but can be lifted vertically when the bolt head registers with the upper part of the tee-

Some men prefer to use flat stock as shown in Fig. 2, and use only a lathe to finish the bolt. The head requires no milling. It must be long enough to prevent turning while in the clamped position.

In Fig. 3 the square head is milled off each side parallel to a line thru the corners resulting in a contact 50 percent of the full square head. In all three views the sectioned area represents the amount of contact in the clamped position. There is so little difference in this contact area in Fig. 3 over Fig. 1 that it is less expensive to use the first method made of flat stock, dubbing off the corners on a grinding machine.

The head shown in Fig. 4 has been used with the idea of obtaining as great a contact area as possible. This supposition is erroneous however, since too much bending action can take place because the leverage is too great. Also, of the four different designs, the last is the most expensive to manufacture.

Fig. 5 shows a front and a plan view of a bolt in a tee-slot, indicating how a hole must be bored from above to the bottom of the slot to accommodate the bolt head. It must be large enough to

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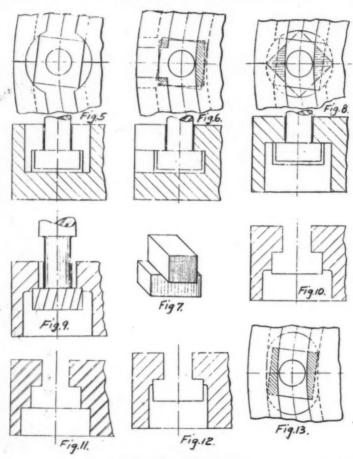
SURFACE PLATE



admit the cross corner dimension. This hole is the break in the continuity of the slot and results in the dead spot of approximately twice the diameter in which clamping cannot be effectively accomplished.

The effect of this inoperative clamping area is somewhat remedied by the method shown in Fig. 6. Here a slot is milled

from the periphery of the table or bracket in to the location of the circular path of the tee-slot. This can be seen readily in the plan view. The bolt can be assembled by pushing it into the tee-slot, and in the position as shown, the clamping area (shaded), while not giving 100 percent contact, does allow some clamping action to take place. The dot and dash lines show the head turned till the corners



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of the head hit the side walls of the slot. In moving the bolt a short distance either way around the circle, so that the head gets no contact on one side of the entering slot, the weakness of this method is apparent. While contact takes place on opposite sides of the head, clamping action becomes off balance in that approximately 60 percent is not effective but is hanging in space. An effort to overcome this deficiency was made in that a stepped plug was made to fill the entering slot as shown in Fig. 7, and screwed in place

after the bolt had been placed in the circular slot. Appearance was enhanced, but the efficiency is doubted. The plug was milled, assembled in the slot after the cutter was travelling about the circular path so that the clamping surfaces of the slot would line up in the two pieces. It can be seen that the tee-slot fights the plug holding screw when pressure is applied upwards against the plug. The making of the plug hardly accomplishes the purpose intended, especially in the smaller sizes of standard tee-slots. The plug



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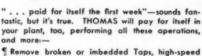
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retaining screw becomes too small for practical purposes,

A similar arrangement has also been used for the design shown in Fig. 5 in which it was possible to leave the tee-bolt in the slot all the time. The hole bored in the center of the slot to admit the bolt head, was machined thru the casting. A round plug of a length equal to the height of the casting and of a diameter for sufficient strength, was machined at the upper end with the tee-slot cutter while the circular slot was being cut. Af-

ter the bolt or bolts were assembled, the plug was replaced and held in with two tangent screws, similar to a "dutchman" pin. It worked well enough but it was decided to try to find a better way, less expensive and more efficient.

The method in Fig. 8 seemed to be the answer to a continuous circular tee-slot without a dead spot or additional machining over the previous methods. The hole was bored from the lower surface of the casting. It was reasoned that the bolt head would have sufficient bearing in any

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position in which it happened to be, as can be seen in the shaded area in the plan view. It was further reasoned that if the bolt-receiving-hole could be cored in, an operation would be saved. However, a small hole, a little larger than the diameter of the bolt would have to be drilled to admit the large end of the tapered shank of the standard tee-slot cutter as shown in Fig. 9. It also meant that this would have to take place for each piece machined. It was therefore decided to do the tee-slot cutting in a vertical boring mill, using a right and left hand offset tool.

A round hole was cored from the bottom as shown in Fig. 10. The depth of this hole should be such that the tool will not have to drag across scale at the bottom of the cored hole. A distance of 3/32" or 1/6" beyond the bottom of the slot is sufficient. In steel, when the hole must be machined, the depth of hole can be made as shown in Fig. 11, viz., to the bottom of the slot is

The final method adopted was that shown in Fig. 12. A square hole was

cored up from the under side to within 3/4" of the top or clamping surface of the tee-slot. The size of the square core was only about 3/16" larger than the bolt head. The 36" contact of head with slot side was sufficient to keep the bolt from hitting the cored sides of the hole. In this method a jump cut had to be taken in the cored square but did not seem to interfere with production. In Fig. 13, an elongated circular hole was machined from underneath, the width of which was the same as the widest opening of the tee-slot. It was used where clearances had to be kept to a minimum to maintain strength of wall as high as possible.

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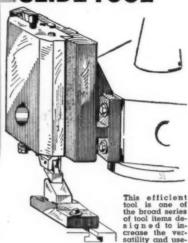
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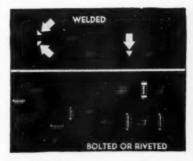
Basic Definitions of Welding Technology

By C. H. JENNINGS*

W ELDING is defined as a localized consolidation of metals and covers that group of processes employed to produce fusion between two or more pieces of metal. The joining of metals by fusing them together makes it unnecessary to employ bolts, screws or rivets. It also eliminates, except in the case of spot welding, the need of flanges, angles and gusset plates which frequently add weight and complicate the design (Fig. 1). Even the flanges, angles, etc., are required in spot welding, many advantages are obtained such as:—fewer parts, no punching or drilling of holes, and no strength reduction resulting from the bolt or rivet holes.

At the present time welding is accomplished in five principal ways:— (1) Forge welding, (2) Gas welding, (3) Thermit welding, (4) Electric arc welding and (5) Resistance welding. Altho this discussion is primarily concerned with only one of these processes (resistance welding) it will be of advantage to obtain a general perspective of the entire field. That group known as brazing processes and the various patented processes based on minor

modifications and combinations of these five principle processes will not be considered.



Forge Welding

Forge welding, probably the oldest method of welding, takes its name from the blacksmiths forge. This process is generally limited to irons and low-carbon steels and plain simple joints. Welding is

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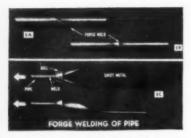
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accomplished by heating the edges to be welded to the plastic stage (below the melting point) by some suitable means such as a forge, furnace, gas flame, etc., and then fusing the plastic surfaces together by means of pressure obtained from a hand, power hammer or some other source. No filler metal is required with this process.

Most forge welds are made by lapping the surfaces to be welded and forging them to a uniform thickness so that the surfaces of the parts are in the same plane (Fig. 2a). Some processes, however, employ a square butt joint of the type shown in Fig. 2b.

Altho forge welding is not so extensively used as the other welding processes, it is still frequently used in railway repair shops, country blacksmith shops, and in the construction of some pressure vessels and pipe.

The longitudinal seams of pressure vessels are welded by beveling the edges. progressively applying heat to the edges by means of large gas flames, and progressively forging the heated edges together thru use of a power hammer. Pipe welding is generally done by heating flat strip in a furnace and then drawing the strip thru a tapered ring known as a bell. The bell forms the strip into a circle, and because its inner diameter is slightly smaller than the periphery of the strip when it is formed into a ring, considerable pressure is applied to the butting edges which completes the weld (Fig. 2c).

Gas Welding

The process of gas welding accomplishes fusion of the metals solely by the heat



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of combustion of suitable gases. No pressure is used to complete the weld as in the case of forge welding.

A large number of gases may be used for gas welding such as oxygen and acetylene, oxygen and hydrogen, oxygen and propane, etc. The oxygen-acetylene combination produces a flame of the highest temperature and is almost universally used except for the welding of aluminum for which oxygen and hydrogen are commonly preferred.

In this process, the heating or welding flame produced by the combustion of mixed gases supplies heat only and does not add filler metal to the joint. The need for filler metal depends upon the joint design and when required is obtained by melting the plate edges (Fig. 3a), melting a joint insert (Fig. 3b) or progressively feeding a rod or bar into the joint as welding progresses (Fig. 3c).

The equipment necessary for gas welding includes among other things, tanks to store gases, regulators to control the gas flow, hoses, torch and tips of various sizes. In cases where large quantities of



acetylene are used, acetylene generators are often employed.

Gas welding is a more flexible process than forge welding and is used on a wide variety of materials, structures, and joints. One of the outstanding features of gas welding is that by properly controlling the gas mixtures the nature of the welding flame can be varied from reducing to oxidizing. This property of being able to control the type of welding flame makes gas welding suitable for use on





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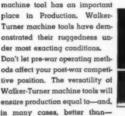


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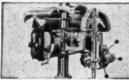
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Altho gas welding can be used to weld nearly every type of material, its application is frequently limited because of economic reasons. Thin materials are readily gas welded, but as the thicknesses increase, the welding speed decreases to a point where other methods of welding are generally preferred. It is not possible to place any limit on the maximum thickness of material that should be gas welded because it depends on the type of structure and the materials used. Materials under 1/16" thick are particularly adapted to gas welding while materials about ¼" thick, with the exception of the non-ferrous groups, are preferably welded by some other process.

Gas welding is applicable to the welding of all types of joints in all positions. It can also be done manually or automatic-

ally.

Thermit Welding

Thermit welding may be done in two ways, with or without the application of pressure, but in either case the welding heat is obtained from a chemical reaction between finely divided aluminum and iron oxide, a powdery mixture known as thermit. Non-pressure thermit welding is the most common type and has wider application.

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is subsequently removed, and the gates

The analysis of the thermit weld can be controlled by the nature of the materials used to make the powdered thermit. Cast iron, mild steel, and low-alloy steel thermit welds are commonly made.

This process is generally applied to large, heavy sections where the ratio of the joint length to the thickness is not too large. It is particularly adapted to the repair welding of large parts such as broken shafts, steel mill rolls, rolling mill frames, etc., altho it is also used to fabricate new structures such as stern parts for ships.

Pressure Thermit Welding is essentially a forge welding process wherein the superheated iron and aluminum oxide slag resulting from the thermit reaction are used as the source of heat. Its applications are limited but it has found extensive use in the welding of pipe and street car rails. Many street car rails are welded by this process.

Essentially this is the method of making pressure thermit welds: The parts to be

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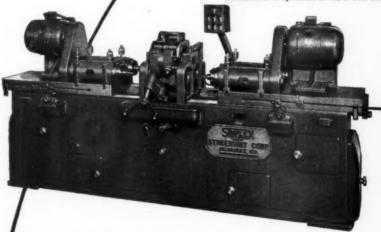
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Precision Boring Machines

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welded have their ends cut square and are mounted in a clamping mechanism which makes it possible to apply high pressure to the joint. A cast iron mold is mounted around the member at the joint as shown in Fig. 5. A thermit charge of the proper amount is ignited and after

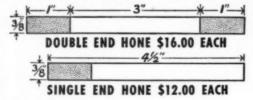
the reaction is completed, the molten slag and metal are poured into the mold, slag first. The charge is proportioned so that the molten metal only comes to about the center line of the parts being welded. The hot metal and slag heat the contact ends of the materials to be welded to a plastic state, following which pressure is applied and this completes the weld.

After the weld has cooled to the desired point the cast iron mold is removed, the half rings of slag and metal broken away thereby leaving the welded joint free of any extraneous material. By pouring the slag into the mold first, the surfaces of both mold and materials being welded are lightly coated with slag so the molten metal will not stick to them.

Electric Arc Welding

In this process welding heat is obtained from the energy of the electric arc, and, as in gas welding, no pressure is used. In general the arc is struck between a suitable electrode and the work (Fig. 6a), altho in some variations of this process the arc

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MODERN TOOL WORKS

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is struck between two electrodes and the arc flame impinged upon the work (Fig. 6b).

In metal arc welding the electrode is made of a suitable metal which melts under heat of the arc and deposits filler metal onto the molten work. In carbon arc welding the arc is drawn between a carbon or graphite electrode and the work. The addition of filler metal in this case is accomplished by melting down edges of the work or by inserting a filler rod into the arc. When the double elec-

trode system is used (Fig. 6b) filler metal is added in a manner similar to that described for carbon arc welding.

Metal arc welding is the most generally used process because it has a very universal application. For the production of high quality welds, electrodes having a flux coating are used. This coating is designed to improve the quality of the weld, add alloy elements and control the weld chemistry, control the electrode melting rate, and improve the arc stability. Many varieties of electrodes are available making it possible to weld low and medium carbon steels, alloy steels, cast iron, aluminum, bronze, brass, nickel, monel, inconel, etc. Welding can be done in all positions on all types of joints.

Are welding is particularly adapted to materials 1/8" thick and above, but it has been used on materials less than 1/16"

in thickness.

Both a-c and d-c power sources are used for metal arc welding, and each has its advantages. A-c is often preferred for complicated work and heavy current welding because of its relative freedom



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and at the other to a vertical screw in the indicator, causing the screw to turn with the gate and move the pointer up and down. Obviously the flexible shaft permits the indicator to be placed wherever desirable. Lots of ever desirable. Lors of variations of this idea are possible. Photo courtesy of Philadelphia Gear

Works.

TRANSMITTING POWER between two parts of a machine twen two parts of a machine with a review of the whole solid short, is a wind that will airect-connect any two parts, regardless of their relative locations. Textile Machinery Co. Southern Textile

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from arc blow and the simplicity and efficiency of the equipment. The primary advantage of d-c equipment is that it can be used in the welding of non-ferrous metals and carbon arc welding, and either d-c or three phase power can be employed.

Carbon are welding is not used extensively, altho it has found a definite field in automatic welding and in the welding of non-ferrous metals having high heat conductivity. The fact that the carbon electrode does not add filler metal makes it possible to control the rate of advance and puddle the weld sufficiently to insure melting of the base metal and proper fusion.

Electric arc welding of all types can be done both manually and automatically and the welding speeds obtainable make it preferable to gas, forge and thermit welding, in most cases. It is applicable to long and short seams and a wide range of material thicknesses. Consequently it has developed into the most generally used welding process.



Resistance Welding

Resistance welding covers a group of processes wherein the welding heat required to make the weld is produced from the resistance offered by the parts and contact surfaces to the passage of a heavy electric current. Pressure is used in combination with heating to complete the welds. Types of resistance welding include spot welding, projection welding, seam welding, resistance butt welding and flash welding. For the purposes of discussion, only the spot welding process will be described.

In spot welding, the pieces to be welded (two or more) are clamped between two



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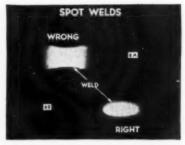
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HALL MANUFACTURING COMPANY 622 Tularesa Dr. & Ph. NO 17570 & Los Angeles 26. Cal. copper or copper alloy electrodes (Fig. 7) mounted in a suitable machine capable of applying pressure between the electrodes. These electrodes are used to conduct the welding current and to supply pressure to the parts. Usually they are water cooled to help prevent sticking, burning, and deformation under heat. The weld is made by passing a heavy current thru the electrodes and work pieces. This heavy current is obtained by practically short circuiting the secondary of an extremely high current welding transformer.



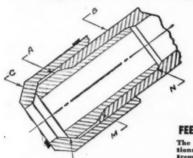
Resistance of the metal pieces and their contact surfaces to the heavy current passing thru them causes intense heating. This heating, in combination with the applied pressure of the electrodes, produces fusion between the parts, resulting in a circular weld known as a spot weld. The size and diameter of the spot weld depends upon many factors such as, type and thickness of parts being welded, diameter and shape of electrodes, amount of pressure, amount of current and welding time. These factors also effect the size of the fused nugget of the weld. In some cases fusion of the metals may extend to the outer surfaces (Fig. 8a), while in other cases it may be confined to a narrow volume as shown in Fig. 8b. In general, a controlled nugget of the type shown in Fig. 8b is preferred, and on certain materials such as stainless steel and alclad aluminum it is essential if proper corrosion resistance is to be preserved.

Seam welding is a process similar to spot welding and varies in that rollers are used for electrodes. By properly tim-

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ing the periods of current flow as the parts are passed between the roller electrodes, a series of spot welds is made. If the spots overlap, a continuous weld is made (Fig. 9a). If the spots do not overlap, (a space is left between welds) (Fig. 9b) and the process is known as stitch or roll spot welding.

Projection welding is another variation of spot welding and consists of placing projections on one of the pieces to be

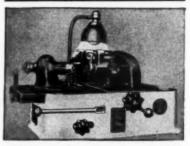
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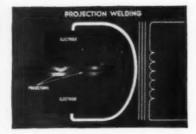
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Send for Bulletins HD-643—HD-441—HD-741 — they detail the uses and advantages of these furnaces. Small heat treating departments and trade schools can now enjoy all the refinements that have hitherto been possible only with large furnace equipment installations. The Paterson Vocational School of Paterson, N. J., in their metal trades division use two Hevi Duty Box Furnaces — a preheat and a high temperature — with accompanying atmosphere producing equipment. With this equipment many heat treating operations can be performed.

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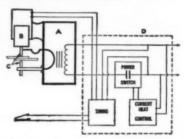
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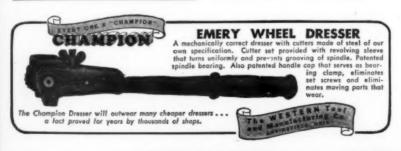
welded (Fig. 10) after which current is passed thru the work pieces. Large electrodes are generally used in this process and the projection locates the points at which the welds are made. Projection welding is particularly adapted to the production of more than one weld at a time (Fig. 10), and to the welding of two pieces varying greatly in thickness.

Resistance welding is a high speed process and is particularly adapted to production work, especially to the quantity production of small parts. It is applicable for use on a great variety of materials both ferrous and non-ferrous, and altho it is most commonly applied on parts \(\frac{1}{2} \) or less in thickness, recent developments have extended the process to the welding of materials \(\frac{1}{2} \)'' thick and above.

The increased knowledge of the metallurgy of resistance welding combined with modern resistance welding machines and control have vastly increased the application of this process. The principal elements of a modern resistance spot welder are shown in Fig. 11.



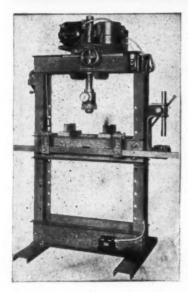
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"B" is a pressure head for the electrodes. In some cases the head is designed so that pressure can be varied rapidly between two values thereby making it possible to use a squeeze pressure (prewelding pressure) or a forge pressure (post-welding pressure) different from the welding pressure.

"C" the electrodes, are made from copper or copper alloys and usually water cooled. In some applications the electrodes are refrigerated.



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"D" controls for the various steps of the welding process.

The problems of resistance welding control may be divided broadly into three parts:

- (1) Start and stop control of the current to the welder.
- (2) Control of the amount of current that flows

(3) Control of the welding time and electrode pressure sequence.

All three of these basic control problems are handled electronically which has resulted in giving resistance welding incomparable speed and exactitude and extended its application to practically every metal fabricating industry, both for sub assemblies and for final assemblies. So precise is the control by electronics that even materials such as aluminum, stainless steel, alloy steel, and magnesium (once considered non-weldable) are now welded on a mass production basis. It is possible to weld two 1/4" strips of stainless steel by shooting thru them a current of approximately 15,000 amperes for 1/5th second. Alloy steels can be welded. grained, refined, and tempered without removing electrodes from the work.

(To be continued)

CHICAGO LATROBE TOOLS

A new 6-page circular entitled "Cutting Tools for Efficient Operations" has been announced. This leaflet shows a number of cutting tools as manufactured by Chicago-Latrobe and gives information as to the adaptability of the various types of drills. The range of sizes in which the different tools are manufactured also are listed.

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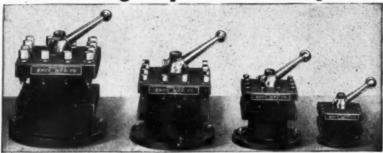
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Single pieces may be held at either end of jaws without danger of distortion because of the construction of the movable jaw with its ground fitting surfaces. This vise is especially adapted for small arms or small part milling. A thoroughly modern vise for modern production needs, it merits your investigation.

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SUGGESTED LATHE SWING	22" to 36"	16" to 24"	13" to 17"	9" to 14"
SIZE OF TURRET BLOCK	41/4" thick 61/2" sq.	3" thick 6" square	21/4" thick 41/2" sq.	134" thick 3½" sq.
SPECIFICA- TIONS	4 Tool 12 posi- tion packed in crate. Shipping Wt. 80 lb. Price \$160.00	4 Tool 12 posi- tion packed in crate Shipping Wt, 50 lb. Price \$129.00	4 Tool 12 posi- tion packed in crate. Shipping Wt, 25 lb. Price \$79.50	4 Tool 12 posi- tion packed in carton. Shipping Wt. 12 lb. Price \$55.00

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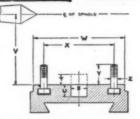
Under high speed production, the new Enco "compound roplacement" furret offers you maximum tool rigidity on heavy cuts. By replacing the compound, this new model eliminates possible sources of chatter and inaccuracy—if gibe or screws are worn—and insures you a cleaner, more accurate finished job every time because tools remain on center.

The turret block has 12 indexing positions spaced 30° apart, permitting each of 4 tools to perform more than one operation. A facing tool, for example, may be used for turning by indexing the same tool to next position. This flexibility means standard ground or angular tools may be used without special re-grinding.

Turrets are shipped complete and ready for use without further machining. When ordering please furnish all required dimensions shown on the chart.

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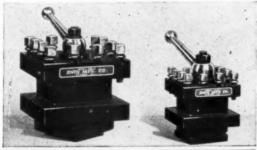
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"A" Dimension Range	2¾"'— 4½"	2" - 3%"
Maximum "C" Dimension	4"	2¾"
Indexing	4 Tool 12 Position	4 Tool 12 Position
Shipping Weight	60 pounds	20 pounds
Price	\$130.00	\$99.00

IMMEDIATE DELIVERY

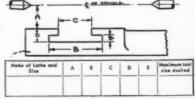
Models HD-1 and HD-2 can be shipped from stock with machinable base which can quickly be adapted to your lathe. One week required for turrets fitted to specifications.

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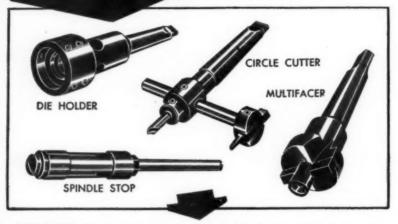
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With the coming change from "all out" production for war, to production for fast growing peace-time needs, machines for making the tools of production are more and more important.

Boyar-Schults Profile Grinders have long been recognized as "vital" tools in the tool and die shop. They are built for economically grinding and finishing irregularly curved surfaces and odd contours so frequently encountered in making dies, punches, templates, cams and special machinery.



Profile Grinder, a bench size Profile Grinder operating at 20,000 R.P.M. For grinding and regrinding die clearances, sharpening punches, and economically grinding cams and templates.



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THE FOREMANSHIP FORUM By Edmund Mottershead

PREPARE FOR PROMOTION

T used to go without saying that today's foremen are tomorrow's managers and superintendents. At the outset of the present war and especially during the first two years of this country's participation in the conflict, foremen, leadmen, skilled workers, and even not-so-skilled workers were shoved upwards in the foreman-manager hierarchy as fast as possible.

One large aircraft manufacturer had less than 4,000 employees of all kinds in 1940, and by 1942 was employing well over 50,000 people, which meant simply that almost all of the original working force was then serving in some supervisory or executive capacity together with several thousand new workers who were advanced as rapidly as possible. As a result it was easy for the skilled worker to see promotion to supervisory work ahead; easy for the foreman to see further advance up the managerial ladder. "Tomorrow" had arrived with a "vengeance".

However, without going off the deep end in post-war thinking or talking about reconversion as tho the war were over and done with, when it may yet run into months and even years, it is inescapably apparent that there are certain changes approaching in the managerial and supervisory staffs of most of our manufacturing concerns.

As the pace of production has stabilized in certain lines, the expansion within a plant and within a given department has tended to cease. Post-war cut-backs are a certainty in many lines and there will be expansion in others. Naturally, management will try to keep the more efficient producers, the more effective supervisors and let the less effective, less efficient go. Added to the impact of the thousands of returning service men will be the desire on the part of thousands of women in our present working force to stay in the jobs on which they have been working during the war. The competition will be keener, if possible, than it ever



was back in the less hectic days before 1938 and 1939. This simply means that the present day foreman or supervisor has two problems:—one, to prepare himself to keep his present job or to advance to a more responsible managerial position because of his knowledge of his job and of the next higher job; and second, to "sell himself" to top management. These two problems are naturally interrelated, but are worth discussing separately.

Efficiency in handling your present supervisory job as such, will be interpreted by top management in terms of costs. Wages have more or less permanently advanced during the war; increases in minimum wages have become part of our national law. Additional taxes have also raised the cost of labor. Wartime competition for labor has further increased the price of labor, and these advances have been written into many union contracts. Some part of this increase in wages has been reinforced by increases in food prices, and higher food costs will mean simply that wages must remain at least

for a large part at the present higher levels.

Even tho the entire economic history of our country is one of improved efficiency, making possible greater production with higher wages and lower prices, efficiency has not increased during the war, for a multitude of reasons. In many instances this has been because many of the best workers have been called into the armed forces; in many other cases because equipment is wearing out in all but the most essential war production activities.

The return to peace-time production will mean more than mere reconversion to the production of peace-time products. It will mean in many instances the reequipping of the plant. It will mean the retraining of the workers, the re-employment of returning men whose skills have rusted while they fought for the right to go on working as they choose. Efficiency at the start will necessarily be less than it was immediately before the war. But wages will still remain at higher levels





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than pre-war. This simply adds up to higher costs and higher prices.

BUT:-the automobile that sold for \$1200 before the war may not sell so readily for \$1500 even tho the higher price is necessary to cover the higher costs of less efficient and more expensive labor. Consequently, in the drive to produce more of a given product to sell for a smaller price, the attention of management will be directed at lower costs and greater efficiency. This will mean economies other than those attained by cutting wages, and greater individual productivity of the workers attained by both new methods and greater individual interest in the work on the part of the workers themselves.

It has been well said that the foreman is the manager of a business within a business. "Management Information", published by the Elliott Service Co., states:—"The foreman, as a manager of a business within a business has to deal with all the same factors with which the general manager deals. He has people to

handle. He must think of costs. He has responsibility for getting returns on a payroll which may run into thousands of dollars per month. He has equipment to look after. He has material to conserve. He has a part of the company property, occupied by his department, upon which he must get a return. On a larger scale, these are the same factors with which the general manager of the company is concerned.

"Thus it is easy to see how a foremanship job gives a man practice and experience in management. He should try to make his decisions like a real manager. He should base his decisions upon the same factors considered by the manager of a separate business. He must always consider the effect of any of his decisions upon the profit or loss on any operations in his department.

"Because a foreman has this managerial experience on a departmental scale, it is only natural that openings in higher executive positions should be filled from among those foremen who have proven





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The new Queen City Super 20 Shaper offers advantages in price and performance no other Shaper of its type can equal.

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For top performance, speed, versatility, accuracy and unusual economy, the Super 20 will fulfil your highest requirements. Write for detailed literature.

The ram is of the V-type of wide bearing. Clutch is dry multiple-disc type. The feed range is extremely versatile—from .008" to .191", quickly and easily changed. A high torque motor for power rapid traverse is standard equipment. An electrical limit switch permits complete motor control. Timken bearings are used throughout.

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themselves to be the most efficient managers of departments.

"In American industry, there is unlimited opportunity for the foremen of ability to rise in the managerial scale. It is practically impossible for a man to step right into top management responsibility without going thru the training which can best be obtained in the ranks of foremanship.

"Once a man is selected from the ranks and given foremanship responsibility, he is in line to move up the managerial ladder. His is an unusual opportunity. H2 is definitely in the managerial circle. His future advancement depends upon whether or not he develops a managerial point of view. He must be able to see things from a management viewpoint without forgetting the viewpoint of workers in the ranks. While he is a foreman, he must interpret management to men in the ranks, and he must also pass up the viewpoints of men in the ranks to the executives above.

"Since the foreman serves as a gobetween, his opportunity to understand both the management's viewpoint and the worker's viewpoint furnishes him the opportunity to get the kind of experience which will qualify him for more responsible positions.

"While a man is in the ranks, he may be only one of a hundred considered for promotion. When he gets into the foremanship ranks, he then may be one in only ten considered for promotion. When he rises to the next grade above foremanship, he may be one of only two or three considered for the next promotion. It all depends upon the individual. In good times or bad, there is rarely an oversupply of men of outstanding ability available for promotion to positions of high responsibility.

"While you are still a foreman, you should be making the most of your exceptional opportunities for learning management functions. Then, when the opportunity comes for you to move higher



When a job calls for two or three tool changes and a cutting-off operation, use a Colwell turret. For on Colwell turrets, a standard cutting-off tool, beveled on both sides so that it clears itself, is mounted directly in the turret, without the use of a toolholder. Saves you the time and trouble of grinding down a square tool bit. Write today for our new folder.

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Anyone can tap holes exactly to specifications; no wasted time, no overtapping.

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is set in an instant without wrenches, ALWAYS shows depth tap has traveled. Eliminates guess work, prevents "freezing" taps in bottom of blind holes.

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on the managerial ladder, you will be prepared for promotion."

The second problem of selling yourself to top management, quite apart from developing such a knowledge of your own job and of the job above you that you are qualified for increased responsibility, can be solved by following a few fundamentals.

You don't want to risk losing out by sounding off on an idea the minute it occurs to you. Sleep over it, Think over all the angles, especially from the viewpoint of top management. Work out a practical solution, a definite method for each step in any new idea. Investigate to see how it might affect other departments or other supervisors. Don't be going off "half cocked". Prepare thoroly for presentation to the man above you, any new ideas you may have, not only so that the ideas themselves may have sufficient merit, but further so you will be in a position to speak effectively on any phase of the idea.



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Short Tool Life and inferior finish were slowing production in a plant machining airplane gears. Several well-known cutting lubricants were used up to seven months ago. Then a Sun Cutting Oil Engineer stepped in, studied operating conditions and recommended Sunicut.

Output increased 150% per tool grind. With Sunicut they increased tool life from a previous average of 8 pieces per tool grind to 20 pieces. Results . . . longer tool life . . . improved quality of finish ... less time lost for tool resetting.

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Any new idea meets with resistance . . . to some extent simply because it is new and different from the rut of habitual thought or action. Anticipate this resistance and prepare for it. Above all, don't let it annoy you or irritate you. There still may be factors in the situation which you may have overlooked. Your idea will stand or fall on how well you have prepared and assembled your facts.

The basic elements of good salesmanship are important in getting favorable attention from top management. See your boss when he has time to give you attention, not when his mind is occupied with a hundred other things and can give you only a part of his attention.



Inter-Changeable -Ball-Bearing Whoels running with the blade give the right kind of smooth-sailing support that enables every band-saw to cut more materials and get more work done. It holds the blade as if it were in a frame . Absolutely friction-free. Safer for workers . . eliminates blade-breakage . TEN DAYS FREE TRIAL will give you the proof. WRITE TODAY.

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Ettco-Emrick System of MULTIPLE SPINDLE HEADS

These 60 high-precision operations on the die-cast aluminum body and cover—some of them on each side of each part—are done on standard drill presses in 4 passes with 4 Etteo-Emrick Multiple Spindle Heads with Etteo-Emrick indexing fixtures, all made for the job from stock items. Keeping fixtures loaded and working the press handles is all the operators do. All locating, clamping and releasing of parts is automatic.

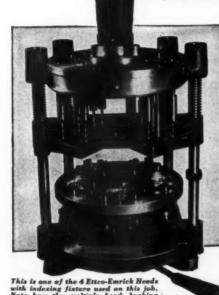
Compare the 90 seconds per body and cover with the time it would take to do these 60 operations the single spindle way, and you can see why the nominal tool cost of Etteo-Emrick Multiple Heads pays for itself over and over again on any large volume of parts — particularly where schedules must be met.

If you have any small parts requiring multiple drilling or tapping it will pay you handsomely to consult Ettee before you go ahead. Send a sample or drawing for recommendations and estimates.

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This is one of the 4 Etico-Emrick Heads with indexing fixture used on this job. Note how the multiple head, bushing plate and fixture are all tied together by the four vertical guide posts into one accurately coordinated unit, all ready for drill press mounting.

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Producing many patterns using only straight knurls, this tool fits lathe turret or tailstock, operating like a screw die on work up to 21/2" dia.

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If you get approval for a new idea, follow thru on it promptly. Don't dilly-dally around basking in the approval of top management, but go out and get the re-

And above all, remember that the man at the top of the managerial ladder is just as much a human being as you are. He wants to feel important. He wants appreciation and the pat on the back from someone just as much as the workers under you do. He is interested in his own health, his own family, his own income and security just as you are. The fact that his responsibilities are greater than yours adds to his sense of self importance. The fact that he may have had more years of experience-that his decisions may be based on a wider range of circumstances than yours must be taken into account. Recognize his experience and ability. Recognize the scope of his

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The COMTOR CO.

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decisions and the size of his responsibilities. Approach from the standpoint of wanting to learn more of what he knows.

One other point:—assuming that you are THE man for promotion insofar as efficiency and handling people in your department are concerned, and have attracted the favorable attention of top management to the point where you are the logical man to select for the promotion, are you available?

Have you looked ahead a little and trained an understudy who can step in on a moment's notice and take over your duties and responsibilities so that production will not falter when you have left your old job? More than one excellent foreman has missed a chance for promotion to higher rank simply because at the time the opportunity for advancement came to him, there was no one to take his old job.

In considering the matter of developing an understudy, there are several things to bear in mind. The man who is

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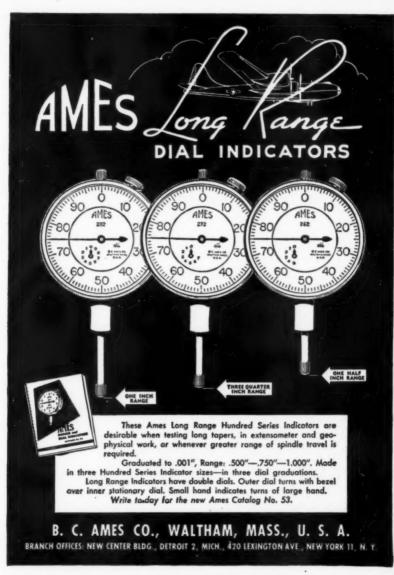
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to take your place likewise has the future possibility of further advancement. He must be competent not only to take your present job, but should have some qualities which will enable him to advance still further. In selecting a man to take your job, you are in reality putting him in line for several steps in advancement which may come to him after you have passed from the picture; so choose carefully.

Secondly, there is the matter of your understudy's availability to take your job. Have you a "sub-understudy" whom he might also train as his own understudy. just as you have built him up to take over? It may well be that there are several workers who might fall into this category. Further, there is the ever-present problem of your understudy's being called into the armed forces. There is still the pressure to draft men of the proper age and physical fitness regardless of how essential he may be to your department. And finally, is your understudy someone who is likely to stay with the company after the war: is he or she a person who looks forward to a fairly long future with

the company. When labor turnover among workers is as expensive as it is today, turnover among foremen and executives is even more expensive in the light of the longer time needed to train people for key positions.

Considering the changes taking place in industry today, you need to look ahead constantly, preparing yourself in knowledge of your job and the next higher job, gaining for yourself the favorable recognition of management for your ability to take on greater responsibility, building understudies who can take over your own responsibilities and leave you free for advancement. Prepare today for the promotion to higher managerial position.

HARDINGE BULLETIN

A new revised bulletin covering Hardinge Master Feed Fingers with adjustable tension has been issued by Hardinge Brothers, Inc., Elmira, N. Y.

The bulletin includes the addition of the Biox Adjustable Tension Masters for No. 00G Brown & Sharpe Machines and the DA-2X Adjustable Tension Masters for ½" capacity Davenport Automatics which are now available, as well as the items featured in the original bulletin.



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ON THE WAR FRONT







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Adjustable to Wheel Wear

Model 10 for 12" to 20" wheels. Heavy duty ball bearings, enclosed in dustproof boxes, support heavy one-piece, alloy steel spindle. Push button control with overload protection. Semi-steel wheel guards are hinged door type, ADJUSTABLE TO WHEEL WEAR. High-grade chrome-manganese alloy steel spindle is provided with positive shaft-locking device for holding shaft while renewing wheels. Motors are capable of heavy duty service, built to N.E.M.A. standards, for continuous service at full load with a temperature rise of 40 degrees.

Standard equipment includes adjustable tool rests, eye shields, straight flanges, water pot and tool tray on 2 h.p. and 3 h.p.



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Berkeley Drives put punch into production schedules by giving you the most effective speeds for your tooling. This is important because you need the proper spindle rpm to gain full benefits in converting to modern carbide tools. That is where Berkeley can help you. He is a pioneer drive specialist. He knows just what you need and can give it to you in drives engineered specifically for your machine tools.



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Output rather than age is the true measure of value of machine tools. In addition to raising production. Berkeley Drives make your machine tools more flexible in operation. You can install them wherever you wish at strategic points in the production line. Current consumption is lower with individual motorizing and there are many other important gains. Without any obligation on your part let Berkeley tell you how you can get more work and more profit from your machines and men.

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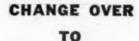
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In drilling, reaming and boring operations, the only way that production can be speeded up to any appreciable extent is by reducing loading and unloading time.

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DRILL BREAKAGE

W ITH the set-up of 8 Govro-Nelson Automatic Drilling Units here shown, 8 holes of 9/32" diameter are drilled at one time through 3/16" steel in 2 seconds.

This high rate is made possible because of the fact that the Unit automatically safeguards the tool against breakage, permitting much faster drilling than with power feed mechanisms which must be set at low feed rates to protect partially dull drills.

Designed for drilling up to %", depending upon the material. In nationwide use by war industries, speeding production and lowering production costs.





Automatic DRILLING UNIT



INCENTIVE TAXATION

By ARTHUR ROBERTS

OUR income tax laws are under fire and numerous substitutes have been proposed, among them incentive taxation. Taxpayers have often asked us about its formula so we offer a summary on the subject.

Its proponents contend that taxing income is wrong because it thwarts effort, particularly where the tax increases as mome increases; that only when individuals and businessmen go "all-out" for results can we obtain full employment and permanent prosperity. This contention has substance because, in the higher brackets, there is little incentive to push for higher volume when the government gets most of the profits.

Conversely, there is little incentive to cut costs when most of the savings are taken by the Treasury Dept. Where war work is being done, volume comes automatically from government contracts. Sales promotion is not needed, but lacking incentive to keep costs down, the government pays producers top prices for war goods, and, in some cases, income taxes are included in these prices because they are costed into production, so that the government's purchases keep rising all the time. In turn, they must keep raising taxes to meet this increased outlay. It is a vicious circle that can end only disastrously.

On civilian production, the incentive to push for more business is dampened by the progressive tax rates—the higher the income, the higher the tax rate. This keeps prices too high and employment too low. We want full employment after the

THE HAMILTON SUPER-SENSITIVE DRILLING MACHINE Self-Contained Drilling Machine For Holes From .004" to .250" Dia.

Swings radially on the column and can be locked in any desired position. Also may be ganged for sequence operations or to increase production. Spindle speeds from 750 to 8750 r.p.m. Full floating spindle to eliminate radial belt pull on the spindle.

THE HAMILTON TOOL CO.

Ninth and Hanover Streets.

FOR BULLETIN



war but we are not likely to get it with a taxing system that restricts the urge to "all-out" on sales.

Incentivists contend that the taxing procedure should be reversed and that we should tax idle money and living standards, sometimes called a "spending tax." In other words, business and employment are kept at tops by keeping money moving. According to them, it isn't the amount of money available but the turnover of money that makes prosperity and those who invest so others can obtain work and spend, should pay less tax than those who keep their money in vaults. The taxpayer who spends on himself, under this plan, pays according to his spendings-the better his living standards, the higher the tax. They reason that corporations and individuals with an average bank balance exceeding \$300 should pay two per cent tex for each turnover less than eight. This is supposed to keep money moving. The taxpayer really levies his own tax under this plan. If he invests less or lives better than his neighbor, he pays more

The mechanics of this system provide for exemptions and would abandon all forms of taxation except on gifts or inheritances, including corporate taxation.

Incentivists claim that, under this plan, corporations must keep their money moving and that it eventually will find its way to the individual taxpayers who pay the toll.

To eliminate property taxes, it is proposed to compute a rental value for all personal dwellings with deductions for interest on the principal. The Henry George plan for taxing real estate not in use is a factor in incentive taxation; likewise, the fixing of a normal price level to prevent inflation and deflation. Henry George was a single-taxer but he wasn't the father of incentivism. However, the incentivists know that the Sixteenth Amendment to the American Constitution authorized the taxation of income and that the use of a property for a home cannot be construed as income so they suggest that such property have a rental value put on it, from which may

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be deducted interest payments, the remainder to be part of the taxpayer's living standards and subject to tax.

All tax plans look good on paper, like socialistic programs but in practice they develop "bugs". One reason the income tax law is so complicated is that clever people found legitimate ways to get around certain regulations. Then Congress would plug up the loop-holes and other clever people would find ways to get around these loop-holes and Congress continued to write new rules to plug up these gaps. This game of tag has been going on for years until now the revenue code is a network of inconsistencies and involved verbiage. It is highly probable that clever people would find legitimate ways of getting around a spending tax too so that eventually it would become as involved as the present law.

Moreover, incentivists urge the artificial fixing of price levels followed by currency adjustments to hold available monev at a ratio that would maintain a favorable status quo, which is more easily said than done. No one knows enough about economic movement to fix a price level. There are no authentic figures of all factors involved and no agency to compile them. Moreover, were such figures compiled, it would take so long to do the job that they would be too old to be of use when determined. Then too, who is to analyze the figures in order to fix price levels? Would political considerations be eliminated? Hardly-ur-less human nature undergoes a change. Controversy would be endless. Every reader knows that contradictory figures are being given the public on almost every

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phase of our economy today, mystifying contradictions that spring, not from deliberate dishonesty, but from different interpretations and groupings of the figures used. In many cases, divergent statements are based upon the same figures from the same sources but opinions differ as to their meaning and application. It is just another version of "Figures don't lie but liars sometimes figure".

The taxpayer should remember that any attempt to fix any element of our economy would cause more trouble than if we let nature take its course. It is surprising how many free enterprisers always talk about fixing output, price levels or some other important business factor in the hope of controlling an evil but the thing fixed must always be beneficial to the advocate of the fix. If his own ox is gored, then it's "no soap." A controlled price level is included in the incentivist plan because the rapid turnover of money would send prices soaring, raise the cost of living high and also the spending tax to be paid. More than likely it would create a lower standard of living than exists under the present taxing system, even if rates are kept high.

Free enterprise means what it says. Any attempt to fix a price level thru incentivism or any other "ism" will work only where enterprise isn't free because uncontrolled prices, from raw materials to consumer, are the essence of free enterprise. If production isn't controlled: if labor scraps all rules that prevent allout production; if prices are permitted to seek a level consistent with supply, de-



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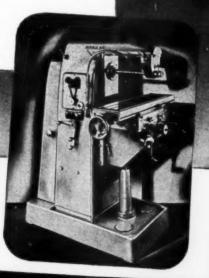
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mand and the degree of service rendered; if all restrictions are off and trade flows freely here and abroad, there should be enough business for the efficient. The inefficient cannot make the grade easily in a free economy. Where any element of business is fixed, there is a premium on inefficiency.

The incentivists' contention that "dead" money make no sales has merit but I think this should apply to buried treasure. If bankers cannot invest the savings deposited with them and get this money quickly into circulation so that the investments will put people to work; if restrictions or big investments in government securities prevent this, that is a banking and currency problem and not one of production or distribution. Much of our trouble is due to the fact that the movement of money is not properly coordinated to the movement of production from raw material to the consumer.

I believe that the fewer the restrictions in the postwar period, the lower the tax because there should be enough business for sometime after the war to pay a substantial dollar tax at a lower rate on income. For the reasons given heretofore, I do not believe that incentivism will give all the abundant life. Lean years and fat years will still be with us. No formula can under-write perpetual sunshine. The wise businessman conditions himself to take the chaff with the wheat and stores up enough in the years of fat to tide him over the lean, at the same time keeping track of his costs for economies and using his head to promote sales to the utmost.

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Photo above shows Jefferson Turrets on 16" lathe



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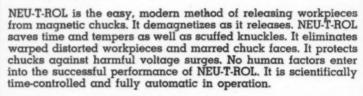
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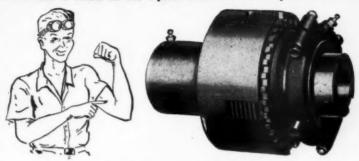
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sible time-saving and labor-saving operations that excite the imagination of constructive thinking shop owners, work engineers, foremen and mechanics. These pictures show you why your shop need not build thousands of dollars worth of special jigs and fixtures every year simply to hold off-center and compound angle work on the machines. Moreover, a lathe equipped with a No. 51 attachment is more suited to most jobs than other machines requiring more expensive set-ups.



No. 51-C-Shown with work holder C. the Lathe Angle Plate is shown finish-boring a die plate.



No. 51-B — Lathe Angle Plate is shown with accessory B turning a compound angle eccentric.

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TOOL CONTROL SYSTEM

A N unusual system of tool control, covering grinding, inspecting, storing, maintaining, salvaging and disbursing of cutting tools, is credited with four-fold advantages at the Grand Rapids Stamping Division of Fisher Body. It is credited with consistently higher levels of machine production, improved quality of the finished product, decreased percentages of scrap and rejects, and increased life of the cutting tools.

The system represents simply an allout application of the indisputable principle that cutting tools will last much longer and perform much better if they are regularly inspected and sharpened.

The system is implemented by a carefully worked-out plan whereby sets of tools are scheduled to the machines according to the operations to be performed

on these machines. The tool sets comprise the entire complement of tools necessary to complete the operation. The length of time which a given set of tools should remain on a given job was determined by an actual performance check, and this governs the replacement cycle by which tools are scheduled to and from the machines.

Grinding and disbursement cribs, along with the tool bank storage, are centrally located within easy reach of all machine areas. Dispatching of all tools to and from machines is controlled by the Production Scheduling Department and deliveries are made by routed trucks which also maintain regulated schedules.

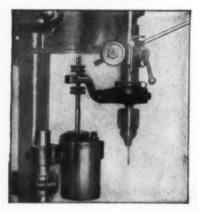
Tool sets, returned from the floor, are inspected upon receipt. Damaged, broken and worn tools, along with those which



Note the mechanical conveyor which carries filled tool sets from the bank stock area, where they have been placed after grinding, to the disbursement crib for storage until needed on a job. The system is paying dividends in efficiency at this Fisher Body plant.

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need sharpening, are removed and tool replacement slips bearing the code numbers of the tools are placed in the box. The containers then pass along a conveyor to the bank stock area. Perfect replacement tools are added to the set, after which it is passed along the conveyor to the disbursement crib for storage until needed.

Dull tools, after being removed from the sets, are ground and honed, rigidly examined, sealed and replaced in the bank stock to await future use.

This tool control system has enabled the Grand Rapids Stamping Division to maintain high production sharpening of precision cutting tools as well as conserve tools and reduce lost time in man-hours and machine-hours on important warproduction operations.

COMPRESSION CHUCK

By ALEX. S. ARNOTT

In grinding special threads on a production basis, accuracy and good workmanship on each thread is most important for the thread dimensions are held very close and must meet rigid standards and tolerances. The problem in tool design is to get the part being threaded concentric in the machine, especially on a large diameter such as 3%4". To obtain the required concentric work with a minimum sacrifice of time, a special compression chuck has been developed to give a high degree of accuracy,



The chuck shown is a simple and effective design which can be adapted to other types of work as well as thread grinding work. This design comprises a main body and a compression ring. The body (A) is made from oil-hardened steel to give it the required springiness, and is bored at (B) thru which a special drawbar is placed to attach chuck to grinding machine, the chuck locating on the taper



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(C). Four slots are cut 1/16" wide, spaced 90° apart, and cut 2½" from the face to the grinding relief (D). To back up work during the operation, face (E) is specially ground for this purpose. To complete the chuck, a thread is cut and ground at (F) and a taper at (G) to accommodate the ring (H).

To compress the chuck, the ring (H) is threaded and tapered to fit the threads and taper on the chuck, and four holes are drilled around the circumference to permit a special hook wrench to tighten ring in place and to assist in putting ex-

tra pressure on chuck.

To operate the fixture, work is placed into the chuck and located on the face (E). Ring (H) is then advanced along the thread, causing ring to climb up the taper, compressing the jaws to grip the work. An even pressure is exerted on circumference of the chuck by the ring, allowing the four jaws to advance simultaneously.

The principle illustrated may be applied to any circular piece of work and may be adapted to any type of grinding machine.

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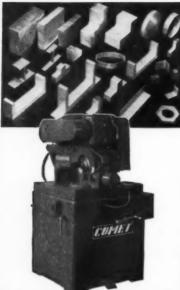




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The storage tubes are extruded by Extruded Plastics, Inc., Norwalk, Conn., for Curtiss-Wright Corp., Buffalo, N. Y. The Tenite used is a cellulose acetate butyrate product manufactured by Tennessee Eastman Corp., Kingsport, Tenn. Photo—Courtesy Eastman Kodak Co., New York.

IMPROVISED COMPASS

By RONALD EYRICH

A machinist's divider can be converted into a compass for laying out templates on cardboard or sheet metal, by attaching a pencil to one leg by means of a short length of coil spring. The spring holds the pencil rigidly.



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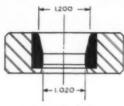


FIG 1. DRAW DIE

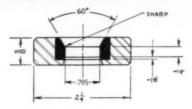


FIG 2 DRAW & PINCH TRIM DIE CONVERTED A-25

It is reported that deep drawing dies of cemented carbide are currently giving unexpectedly good results in the production of cases for radio tubes. Here, on an operation where 100,000 pieces per die gives profitable performance, some of the carbide dies have turned out as many as 750,000 pieces-four times more than was calculated before these dies were installed.

The material being drawn is tin plated sheet steel, .011" to .012" thick. Discs, 2-9/16" in diameter are blanked and cup-

ped in two operations. The first cup is 1-5/32" O.D. and 11/4" high. The first draw is in the carbide die illustrated in Fig. 1. The cup is then 1.020" O.D. and 11/2" high. The second draw is thru the die shown in Fig. 2. Its diameter is .795" and the draw angle is not blended but is cut 60° included for pinch and trim. The cup is then finish drawn at size .795 by 1-11/16" high and with a .010" wall. The trimmed mouth of the cup is very clean and even. (Note photo).

Some of the cemented carbide dies of

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the 1.020" diameter have run as high as 750,000 pieces. One of the .795" diameter dies has, to date, exceeded 100,000 draws and is still turning out excellent grade work. It is also interesting to note that the change over to carbide dies was made within a single week, all machines being equipped in this time by the use of Carboloy stock dies, converted where necessary.

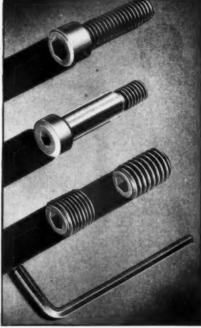
"SCREWED-ON" TOOL BLANKS

Kennametal Inc., Latrobe, Pa., has developed a new type of Kennametal tool blank having a drilled and counterbored hole to provide for attachment to steel shank by means of a recessed-head cap screw. The angularly-set screw serves merely to hold the tip against the recess walls, which resist the main cutting thrusts.

These blanks are now available in several of the larger sizes, with formed clearance angles, RH or LH, and in all standard grades of Kennametal. Complete tools of various styles—straight edge, lead angle, offset, etc., can now be furnished with screwed-on tips or separate standard blanks will be supplied to those who wish to make their own tools. Blanks of non-standard shapes and sizes having







73 YEARS

in Threaded Products

In 1872, our first screw wobbled momentarily on the bar end, and then, with the help of the cut-off tool, detached itself and fell among its turnings.

During the ensuing seventy-three years, millions of its successors have flowed from a thousand machines, and each one has been fondled as was that first screw.

That's why The Chicago Screw Company, with the advent of socket screw products, was ideally prepared not only to manufacture and expand the use of these items but, of vastly more importance to industry, to improve the standard of quality to a perfection never before known for this commodity... This standard is reflected in the complete line of Chicago "Safety Plus" Socket Screws.

These Fine Products are sold only thru Authorized Distributors.



THE CHICAGO SCREW CO. 1026 So. Homan Avenue • Chicago 24, III.





"HANDIEST MACHINE IN THE SHOP"... That's what users call the versatile Milwaukee DIE FILER

This sturdy, compact, bench-type reciprocal filer is used in Die Shops, Tool Rooms, Machine Shops and Metal Working Plants... in the sawing and filling of tools, dies, jigs and fixtures... in trimming small parts... in lapping operations.

It promotes precision workmanship, permits speedy set-ups and easy inspection of internal filing. At its rated speeds, it equals the efficiency of larger, more costly machines. The biggest dollar value in its field at —

\$12500 F.O.B. Milwaukee

COMPLETE with MOTOR and SAW ATTACHMENT

\$11850 without Saw Overarm. For machines without motor, deduct \$8.50 from these prices.

Manufactured by

Milwaukee

CHAPLET & MANUFACTURING CO.
1027 5, 40th St., MILWAUKEE 4, WIS.

this feature may also be had for special tools, such as are used in shell turning, form cutting of radii and grooves, etc.

The advantages claimed for the new design are:—(1) Greater durability in use, and in grinding. (2) More consistent performance. A positive mechanical fastening displaces uncertain brazed joints. (3) Opportunity of heat treating shanks to withstand the pressure of heavy cutting. (4) Simplified fastening. Only one removable element—a cap screw. (5) Removable element—a cap screw. (5) Removability of tip permits independent grinding of shank. (6) Streamlined design with no projection beyond shank cross-section. (7) Minimized stock requirements, as tips of different Kennametal grades can be interchanged in the same shank. (8) Simplified tool making, as most shops are better equipped to drill and tap holes than to braze joints properly.

UNIVERSAL PIERCING DIE



Piercing holes in low activity sheet metal products at this plant was quite a production problem until the universal piercing die shown in Fig. 1 was installed.

The die consists of a steel block in which is located a turret holding several size dies for the most commonly used holes. The turret is turned by pulling the handle on the right hand side of the die. The punch holder is made so that the punches can be changed from one size to another with a minimum of time. Spare

"BASIC UNIT+PARTS" PLAN

Gives you a Specialized Production Lathe at Lowest Cost



Above is illustrated the "MINNEAPOLIS" Production Lathe equipped with all-electric variable speed drive. Speed range from 0 to 1500 RPM in either direction provides exactly the speeds needed for any series of maching operations. Any speed desired is instantly obtained with a crank while lathe is running. A dynamic brake operates automatically for quick stopping and reversing.

BASIC LATHE UNIT

with any one of 4 drives: single speed, low speed chain drive, four speed, or all-electric variable speed as shown above. You can then add only the equipment needed for your particular production "set-up".

SMALLER INVESTMENT – Lower Production Cost

The "MINNEAPOLIS" Production Lathe is extremely adaptable to any production set-up, particularly second operation work. Its simplified design and ease of control enable inexperienced operators to turn out high speed volume production.

The "MINNEAPOLIS" has 2½" collet capacity, 14" swing, heavy duty spindle assembly. It is backed by more than 50 years designing and manufacturing experience. Send for literature — write us your production problems. Send sample part or drawing if possible — let us quote you on a "tailcr-made" lathe for your work.

CENTRAL MACHINE WORKS CO.

Machinery designers and manufacturers since 1890

1229 Central Avenue

Minneapolis 13, Minnesota



HYBCO TAP GRINDERS Sharpen ALL The Vital Points CHAMFER • FLUTES • SPIRAL POINT

Fast—easy to operate. Complete—no parts to change. Capacities—No. 2 to 1½" fund taps—with interchangeable heads.

HEADS ONLY AVAILABLE FOR USE ON UNIVERSAL TOOL 6 CUTTER GRINDERS.

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HENRY P. BOGGIS & CO. 1279 W. Third St., Cleveland 13, Ohio



MODERNAIR CHUCK NO. 10

1. Uses Your Present Stock of Collets!
2. Reduces Machining Costs!

3. Increases Productive Capacity!

One model handles 5-C and 1-J Collets in full range. Inexpensive adaptors available to accommodate all standard makes of collets.

(See your local machine tool distributor or write us direct for complete illustrated bulletin.)

THE JOHN E. GOLDRING COMPANY 617 So. Olive St., Los Angeles 14, Calif. punches are kept on hand at the left side of the press.

Hand wheel at front of the die adjusts the back gage which holds several adjustable fingers and is used to space the holes. The gage at the left side of the die is also equipped with fingers and serves the same purpose as the back gage, but is used for larger sheets that have holes to be punched on the same centerline.

The adoption of this die reduced tooling costs and also speeded up production, since extra dies did not have to be built.

By J. Gebbie, Westinghouse Electric & Mfg. Co., East Springfield, Mass.

ELECTRONIC TUBE PARTS





PRECISION CENTERED EYE BENDING

A Centered EYE in 1 Operation

The DL-ACRO Bender makes perfectly centered eyes from rod or strip stock at a high rate of production. Both eye and centering bend are formed with one operation. Any size eye may be formed within capacity of bender and ductile limits of material.

BENDER No.

Forming radius 2" app.
Capacity 7/32" round
cold rolled steel bar or
equivalent. All DI-ACRO
Benders have two-way action, right or left hand
mounting and reversible
forming nose.



with

DI-ACRO BENDERS

DI-ACRO precision bending is accurate to .001" for duplicated parts. DI-ACRO Benders bend angle, channel, rod, tubing, wire, moulding, strip stock, etc. Machines are easily adjustable for simple, compound and reverse bends of varying radii.

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"DIE-LESS" DUPLICATING

showing many kinds of "DIE-LESS DUPLICATING" produced with DIACRO Benders, Brakes and Shears.



Pronounced "DIE-ACK-RO"

BENDER No. 2

Forming radius 6" app. Capacity 1/2" round cold rolled steel bar, formed cold to 1" radius. DI-ACRO Benders form bus bar and other strip stock both flat and edge-wise.



BENDER No. 3

No. 3
Forming radius 9" app.
Capacity 1/2" round cold rolled steel bar, formed cold to 1" radius. Bender No. 3 is especially designed for directaft, marine and other large ra-

dius bending.





O'NEIL-IRWIN MFG.CO.

314 8th Ave. S., Minneapolis 15, Minnesota

TOOL CRIBS



WINDOW GUARDS WIRE MESH IMMEDIATE DELIVERY

SEND FOR CATALOG
WIRE & IRON WORKS
CANFIELD & MORAN STS., DETROIT 7, MICH.
THIS IS OUR FORTY-SIXTH YEAR

CUT SET-UP TIME
75%
WITH THE USE OF
ADVANCE

T-SLOT CLAMPS Speed - Accuracy - Economy - Safety

The only T-slot clamp made. Clamps directly over work. For use on all machines with T-Slots, Standard, Heavy Duty and Angle Types.



Send letterhead for catalog

ADVANCE MACHINE WORKS 3727 Weisser Pork, Ft. Wayne 5, Ind. Even a minor operation such as bending lead-in wires is important to war production these days. Cecilia Trombacco uses a special jig to put the proper bend in the molybdenum conductors at the Dobbs Ferry, N. Y. plant of North American Phillips Co., Inc. The Company is producing large numbers of cathode ray, transmitting and power tubes for the Armed Forces and war industries.

INSERTED-TOOTH CUTTER



Tungtip Division of Lowell & Grayson, Monrovia, Cal., offers an Inserted-Tooth Milling Cutter, consisting of carbidetipped inserted teeth rigidly locked into the tool body without extraneous parts.

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S.—Inexpensive—last for years.

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NIELSEN TOOL & DIE COMPANY 1962 W. Eleven Mile Road, Berkley, Mich.

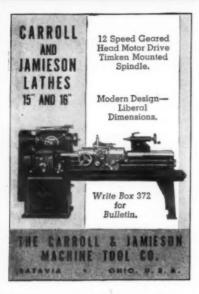




GETCO TOOL COMPANY

CARBIDE SPECIAL CUTTING TOOLS HI-SPEED 15541 PLYMOUTH RD., DETROIT 27, MICH.

- VERMONT 7-1770



REYNOLDS COOLANT UNITS ARE EFFICIENCY EXPERTS!



Showing Reynolds No. I-S attached to milling machine

Designed to promote peak performance in machines using a coolant (cutting or soluble oils), Reynolds Coolant units are the answer to demands for increased production and longer cutting tool life.

REYNOLDS MACHINERY CO. 211 EDDY STREET, PROVIDENCE, R. I

These carbide-tipped tool steel inserts are provided with precision flat backs and serrated front faces, which assure uniform clamping pressure over the entire length of the inserts. This rigid locking maintains blades in correct position regardless of cutting pressure.

A simple, ingenious adjusting screw mechanism provides for precise adjustment of the insert to within .003", thus eliminating rough grinding of inserts. Replacement inserts are provided with face of the carbide, finish ground and the cutting edges rough ground to reduce user's maintenance cost.

Tungtip Inserted-Tooth Cutters are available in Face Mill and Half-Side Mill styles. The alloy steel body of the Face Mill is accurately counterbored in back of cutter, providing a ground surface for accurate location on outside of spindle nose of the milling machine. Half-Side Mills are provided with precision ground arbor holes and hub faces for accurate alignment for straddle milling operations. Both types of cutters are available from Tungtip Division of Lowell & Grayson stock with carbide teeth ground with corner angle (lead angle, see illustration) or may be had with inserts ground to 90° corner for milling to a shoulder.

The makers assert that by designing a complete line of milling cutters in which all the advantages of tungsten carbide milling can be fully realized, Tungtip engineers have made available, tools with longer life, capable of producing to closest tolerances, more parts per hour

MECHANICAL PROVING GROUND By LLOYD STOUFFER

Ingenuity of automotive engineers was responsible for a unique mechanical device which largely obviates the necessity for proving-ground tests of 5" naval guns, and thus speeds progress of these vital guns from factory to actual use against the enemy.

NEW LOW COST GRINDER DRILL

Anyone can do expert drill grinding with this simpleto-use drill grinding attachment fits on any bench grinder saves buying new twist drills saves time



and materials that dull bits waste. Grinds bits from 3/16 to 1¼. Write for FREE liter-

ature.



Note powerful double grip afforded by long extra heavy ferrules, machine-formed over special shoulder on shank.

OUNDRYMEN and shop men like Air-O-chek Air Guns because they are leakproof, trouble free and avoid costly maintenance.

Air-O-cheks are easy to operate because the exclusive ball and socket joint between the valve and actuating lever permits full discharge with a slight flex of the hose. Shut-off is instant and positive even after years of service because of the natural resilience of the hose aided by the air pressure within.

Air-O-cheks have no packing gland, no external buttons or levers—in fact they have only 3 moving parts, all easily accessible for servicing.

Results speak! Install a dozen Air-O-cheks and test the difference.

Streamlined Air Hose Assembly. Consists of Air-O-chek Air Gun and standard pipe fitting ferruled to hose. Convenient and economical. Shipped ready to install.

AIR-WAY PUMP & EQUIPMENT COMPANY, 401 S. Jefferson St., Chicago 7, III.

IMMEDIATE DELIVERY

3,000 New Steel Stacking Boxes



\$2.00 each, F.O.B. Chicago

24"x15"x7½—18 gauge. Drop handles both ends. Lots of 25 or more.

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NEW Angle Adaptor







Converts any drill press into a versatile multi-purpose machine. Permits any spindle angle . . . at any height...herizontally or vertically. Makes burring, sanding, buffing, grinding, angle drilling easier, more convenient, twice as fast! Write new for descriptive literature.

NOBUR MANUFACTURING COMPANY
910 North Grange Drive Los Angeles 38. California



The device is one of the largest and most interesting of the many improvisations the automobile industry has contributed to war production, and it illustrates how this interest sometimes carries far beyond the actual production phase for which the factories are responsible.

The development started when engineering experts at Fisher Body's Pontiac plant chafed at the fact that when they speeded up production of 5" guns, they ran into a bottleneck in the subsequent test-firing operation. Altho this was actually outside their province, they started casting about for some means of simulating actual firing conditions so that any necessary adjustments could be made before the guns left their plant.

The result was the ingenious device pictured. By substituting compressed air, it was possible to obtain the same reactions as would result from actually firing the powerful guns. It accurately tested the kick, rammer and firing of the cannon. Thus another bottleneck was broken, and the flow of these important guns into war use was greatly accelerated.





These Stamps are made of the finest carbon steel to protect against breakage and give you years of service on all part marking work. The letters or figures are deep cut with sharp faces for ease of stamping on even the hardest metals. Accurate bevel further assures clear impressions, and aids in alignment. The husky steel body is amply large to withstand severest use.

A large stock of Mercury Steel Letters and Figures in sets and sorts is available in sizes to meet a complete range of metal marking needs. Special sizes can be made to your specifications, if desired. Write Dept. B for complete details, and briefly outline your marking problem for our recommendation on the Mercury Stamps to meet your needs!



Metal Marking Tool Specialists for Over 25 Years

MERCURY METAL DIE AND LETTER CO.



WELDING BENT SHAPES

The welding of odd shaped pipes for cargo ships and tankers has been greatly speeded by this War Production Sug-gestion of Fred Craytor, a welder at Marineship Corp., Sausalito, Cal.

A roller stand and positioner rotates the large, odd shaped pipe so that the welding is easily and quickly accomplished. The device consists of a stand, weld-ed from steel salvaged in the shipyard,

which holds the various sizes of pipe securely against drive rollers by pressure rollers. Speed of the drive rollers and rotation of the pipe are controlled by a foot lever. This permits welder to weld on top of the pipe, always in the most convenient downhand position.

The old method made it necessary to weld all around the pipe which was slow and often very difficult to reach points underneath. Frequently it required the

ARE YOUR STUDS "TORQUE" DRIVEN?

A torque-driven stud is always right when set with

THE BUFFALO TORQUE CONTROL STUD DRIVER

Constructed as a unit consisting of a driving end and a driven end, connected by an automatic clutch, the BUFFALO TORQUE CONTROL STUD DRIVER is fitted with an automatic self-releasing holder for the stud on the driven end of the unit. Torque is, controlled by means of the adjusting set screws mounted on the top of the unit.

When the stud has been driven to its exact setting, the holder automatically releases, at which time the operator reverses the spindle of the operating tool and the stud driver backs off without unscrewing the stud or damaging the threads.

Also manufactured as Nut Setters, Transmission and Machine Tool Types.

Write for complete descriptive Bulletin No. 1005 today!

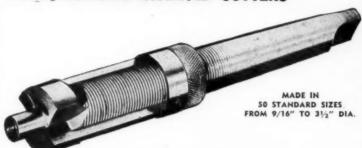
BUFFALO MACHINERY CO., INC.
Grant Street
Buffalo 13, New York

838 Grant Street



Model SD-4

COUNTERBORE and SPOT FACER WITH MOVABLE INSERTED CUTTERS

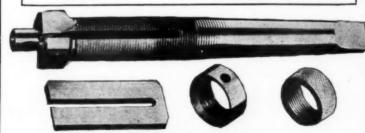


only NASH-ZEMPEL has these 12 features

- 1. Cutter removed easily for sharpening.
- Cutter always aligned accurately with body of bar.
 3. Maximum cutter life.
 4. Milled web locates fingers of cut-
- ters while cone nut centers rear of cutter.
- Movement of cutter equals expendable portion. Cutting edge of tool always in
- same place.
- 7. Chip clearance in bar not in cutter.
- Easy method of locking cutter
- securely.

 9. Economical to operate—only cutter to replace when used up.
- 10. New cutter means new spot facer or counterbore,
- 11. Pilot drilled and tapped to hold different size bushings.

 12. Made in 50 standard sizes. Spe-
- cial requirements made to order.



Send for Descriptive Literature

Send in sketch of your requirements and we will be glad to quote prices. Special sizes can be furnished with pilots, straight shanks or special tapers, other than the standard Morse tapers, which are listed on the specification sheet.

ACME TOOL CO

200 CHURCH STREET NEW YORK 13, N. Y.

SEE BETTER - WORK BETTER



CARL ZEISS INC. HEADBAND MAGNIFIER 21/4x

Use of both eyes reveals true depth of details. Magnification of 21/4x. Free working distance,

about 8", permitting unhindered use of hands. By just lifting your head, your eyes are free for any other activity. Eyeglasses may be worn while using. Highest optical quality. Eyeshade of Tenile—practically unbreakable.

Also Aplanatic Folding Pocket Magnifiers 6 and 9 power



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CARL ZEISS, INC.

Dept. H-55-5, 485 5th Ave., New York 17, N. Y.

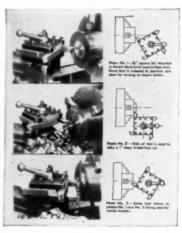


use of chain blocks and small cranes in order to turn pipe so that it might be welded.

Production of these odd shaped pipes has been increased 33-1/3 percent and besides being safer the device, has completely eliminated tying-up of cranes during welding.

(Data and Photo Courtesy, The Hobart Brothers Co., Troy, Ohio)

TWELVE POSITION INDEXING



Increased flexibility in use and extreme versatility are claimed for the new "Enco" Turret Tool Post. All "Enco" models have 12 positions indexing or 3 individual working positions for each tool. Spaced at 30° apart, this 12 position indexing permits each tool to perform more than one operation. For example, a fac-



VARIABLE SPEED TRANSMISSION

For "A" section V-belts_3.3_1 speed range_perfect belt alignment in all positions. Priced so low that no shop or machine need go withoutinfinite speed selec-\$16.50 (3 Types-8 sizes to choose from)

Standard Transmission Equipment Co. 3409 VERDUGO ROAD

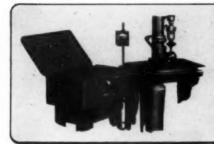
LOS ANGELES, CALIF.

Drafto Metal Disintegrator saves two \$1500.00 crankshafts

Two badly needed crankshafts each had a broken quarter inch drill embedded in an oil hale five inches below the surface. Cancellation was imminent.

Drafto rushed special length electrodes. Set-up and disintogration time for the first drill was four and one-half hours. The second drill was disintegrated in an hour and one-half. Both jobs passed government inspection.

Estimated saving, \$3,000. Also important, the badly needed shafts were completed and shipped in a few hours.



Typical set-up using drill press.

Disintegrator "head" chucked solidly in locked press; work piece clamped firmly to table. Disintegrator may be set up to operate at any angle. "Head" does not rotate.

THE Drafto Metal Disintegrator is a compact, portable, self-contained unit designed to save dies and work pieces you formerly scrapped because of embedded tools. It disintegrates metal through the action of a rapidly vibrating electric are, without excess heat or pressure.

Broken taps are removed by disintegrating the care. You take out broken drills by disintegrating the web. Studs and hardened pins are removed by disintegrating add shaped holes.

Finished surfaces, hardness of metal, and delicate contours are not affected, for disintegration takes place only where the electrode touches

Drafto Metal Disintegrator requires no lengthy training period. It comes to you complete, ready

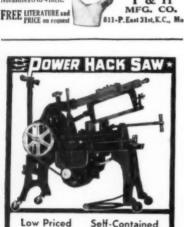
to go to work, with its self-contained coolant tank and pump, and a supply of electrodes for \$295. Manufactured by Drafto Corporation. Cochranton, Pa. Representatives in key cities.

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\$295 complete







Low Priced Self-Contained

Portable

Ready to Work-Economical Sturdy

Write for Bulletin No. 100

ing tool could be used for turning, and if necessary, an inside or outside chamfer depending on the work. This 12 position indexing also provides a quick set-up for threading. Complete jobs may be set up at one time eliminating tool changes and lost time in second operation set-ups on production or toolroom jobs. Standard ground tools and standard square or rectangular tools as well as standard boring bars may be used. The 22 different models cover almost all lathe swings from 6 up to 36". These are available from Enco Mfg. Co., Dept. 125, 4522-24 Fullerton Ave., Chicago 39, Ill.

MONARCH REPORTS

In his recent letter to shareholders, Wendell E. Whipp, President, Monarch Machine Tool Co., pointed out that the company's production for 1944 included not only the manufacture of lathes but also work on 30 war contracts for other products.

Biggest of these contracts were for Bofors gun parts and for power take-off units for the Rolls-Royce Merlin aircraft engine. The work on gun parts will be completed by the end of the first quarter of 1945, Mr. Whipp said, while the power units require 12 months or more to com-

"Meanwhile the demand for lathes, particularly for shell turning and for rocket manufacture, has grown by leaps and bounds. Monarch also has urgent orders from the Army, Navy and Maritime Commision for turning machines with which to build jet propulsion aircraft and vital

Ordnance and Signal Corps equipment. "Looking to the future," Mr. Whi Mr. Whipp added, "there has been much talk about the great overproduction of lathes and other machine tools for war, with a consequent destruction of the peacetime mar-ket for years to come. A logical appraisal discounts much of this kind of thinking.



YOUR LOWEST COST "HANDY MAN" PORTELVATOR (Elevating

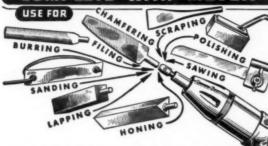
No referrals needed, no time sheets, no clock to punch ... PORTELVATOR carries things all through your plant. Acts as work bench, table, lift, truck . . . 'neverything.

Write for details. Ninth and Hanover Streets.

Table)



PORTABLE Electric TOOL



Motion is "in and out"—not spinning or rotary. Tool is portable—carry it anywhere—five pounds—easy to handle. Self contained. Ready to plug into any 110 volt electric outlet. Use it to work on any metal, wood, plastic or other materials that may be filed, sawed or polished. Delivers 1000 short, accurate strokes per minute, much faster than hand methods, no chattering. Complete line of files, scrapers, hones and other accessories available. Change accessories in 20 seconds. Used in largest plants and small shops.

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HAH RESEARCH CO.

* ENGINEERED TO supplant hand finishing, and for bench work.

★ SELF POWERED—one complete unit, no power unit to buy—no motor to attach.

Generally in from 6

to 10 days

after

receipt of

your order

with

priority.



YOHE RACKS

 Save Floor Space Have Greatest Capacity

Use singly along walls or back to Use singly along walls or back to back. Keeps floors clear. Promotes safety. Saves time in locating material. 4 arms, 51" high stacks 10,000 bb; 5 arms, 57" high, 12,000 lbs; flat or round stock. Pipe and tube, less weight. 3 stands for 20' lengths. 2 for 12' and shorter. Low Cost. Big Value.

Write today for circular and prices. Priority regulations govern delivery. WM. S. YOHE SUPPLY CO. 503 Mahoning Rd., N.E. Canton 4, 0. The jobs of war are rugged ones. Ma-chine tools operating 24-hours a day, 7days a week and in inexperienced hands are aging many times as fast as normally and a good many will have to be replaced completely by the time victory has been won. At the same time a greater appreciation and dependence on things mechanical has come out of the war to date and will create a demand for a larger number of machine tools in the future.

"Intensified industrialization in foreign areas is also likely to add to the demand for more machinery. Finally, a proposal for maintaining certain defense plants intact for the future national security may serve to withdraw still more machine tools from the domestic market.

"While Monarch's output of turning machines will not continue altogether along present lines, but rather will be one of custom building of special machines; present indications point to an increase in volume over the prewar years. We have, for example, booked more orders than we have been able to make shipments during recent months and are receiving orders now for postwar delivery from customers who are afraid they may otherwise have to 'wait in line' for machines when they need them."

YOST DRILL PRESS VISE



This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes.

Vise He.	Width of Jaw, Inches	Opens Inches	Weight
1D	31/2	314 512	121/2

Do you need a vise of ANY type?

Write today for bulletins on the extensive Yost line

YOST MFG. COMPANY 1335 SC. MAIN ST. MEADVILLE, PENNSYLVANIA

ROTO-FINISH BULLETIN

A new bulletin describes Roto-Finishan accurate mechanical process for deburring and finishing metal parts.

How to save manpower is described by showing how Roto-Finish mechanical deburring and finishing may be performed by one operator, permitting transfer of skilled help to other vital production jobs. Accuracy of the Roto-Finish Process is illustrated and described with information presented on the closely controlled

cutting actions that provide fine surface Copies may be obtained by writing The Sturgis Products Co., Sturgis, Mich.

LABORATORY GRADED PURE DIAMOND POWDERS

STAR DUST speeds up production enormously and produces finishes and superfinishes down to less than .0000004 of an inch.

finishing to heavy grinding cuts.

Precision LAPPING POWDERS for PRECISION work

For GAUGES, TOOLS, DIES, etc., with tremendous TIME SAVING. These factors make STAR DUST indispensable in lapping and superfinishing on HARDSTEELS, TUNGSTEN CARBIDE, CHROME.

 Absolute control of particle sizes
 Complete absence of out-size particles
 Complete range of grit sizes There is a STAR DUST Field Servicemen in your territory.







SAVE TIME AND MONEY THESE 5 DIFFERENT WAYS

This small compact electric furnace is inexpensive, handy and easy to operate ideal for small tool and die shops—saves time these five different ways:

- Eliminates delays in sending small machine parts out to overcrowded commercial heat treaters.
- 2 Saves time and expense of drawing or tempering small metal parts in large furnaces.
- 3 Cuts handling time when normalizing or annealing small parts. No waiting.
- Conveniently available for pre-heating for subsequent high-speed hardening.
- 5 Eliminates shut downs and delays in servicing emergency repair orders.

AVAILABLE IN TWO SIZES

Type	Chamber Capacity	Amps 115 V	Watts	Amps 230 V	Price
MH-3	8"W 6"H 14"L	29.6	3400	14.8	\$124.00*
MH-4	10"W 6"H 18"L		4800	20.9	\$191.00*

*Includes Hearth Plate

MAX. SAFE TEMPERATURE—Continuous operation, 1750° F.; Intermittent operation, 1850° F.

AUTOMATIC CONTROL—Indicating Controlling Pyrometer—Thermo-couple and lead wire complete—\$152.40.



REPLACEABLE HEATING ELEMENTS—Replaceable nickel chromium resistors embedded in rectangular refactory blocks. Elements form inner walls of furnace chamber, and may be replaced easily and quickly after removing rear panel—furnace structure remains undisturbed.

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tional applications and ordering instructions are included in this new folder. Write for your copy today. Ask for Bulletin No. 50.



COOLEY ELECTRIC MANUFACTURING CORP.



Sensationally Fast, Safe and Widely Applicable..

this method is rapidly displacing other cutting methods. Learn all about it and the machines that make it possible —

Tannewitz
HIGH SPEED
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THE TANNEWITZ WORKS GRAND RAPIDS

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So-called "bargain diamonds" regardless of their compara-tive original low cost, literally burn up your money. Their sole reason for existence is price and not durability and efficiency. You'll find it cheaper in the long run . . . and more profitable . . . to choose DESSAU DIAMOND TOOLS. For over 100 years they have been recognized as leaders in their specialized field.

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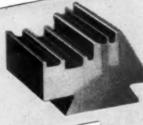
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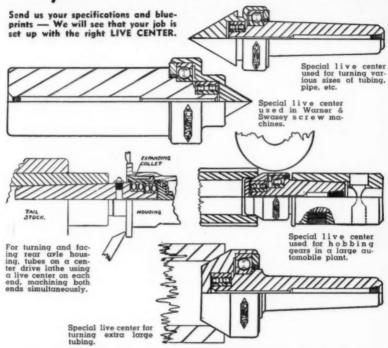




As the basis of your precision products your cutting tools must be accurate and long wearing or your entire production will suffer. We invite your inquiries on CARBIDE-TIPPED of HI-SPEED cutting tools and promise you prompt estimates and attractive deliveries. Write for new illustrated bulletin No. 301, showing some of the types of tools we manufacture.

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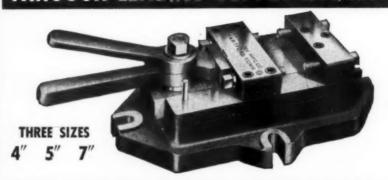
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Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action . . . that compensates for expansion due to heat, shock and excessive thrust loads — reducing wear to a minimum. A properly engineered live center is one of the fundamentals of setting up a job and requires a specialist's experience . . . standard shanks with Morse taper carried in stock — prompt deliveries on high priorities.

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A partial list of suppliers who are prepared to give you special service. If your territory is not listed write direct.

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The Globe Machinery & Supply Co. Des Moines, Iowa

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Kasper & Koetzle, Inc. Brooklyn 6, New York Lafayette Tool & Supply Company New York 13, N. Y.

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IT'S TRUE! Now you can buy handscraped surface plates and other highquality precision equipment at α sensational saving—40% of former costs. It's all due to the new Lombard lowered-price policy . . . the result of improved manufacturing techniques.

In preparing for reconversion activity ahead, take full advantage of this substantial new price reduction. Why pay more when the best now costs less? You

may purchase Lombard precision equipment with the reassuring knowledge that every product bearing the Lombard name is backed by a reputation for precision craftsmanship recognized these past fifty years.

Lowered price . . . same excellent quality . . . prompt delivery — three important reasons why you will want to write to-day for descriptive catalog and price list. Just be sure to indicate sizes desired.



A Few Choice Territories Open for Aggressive Distributors

LOMBARD GOVERNOR CORPORATION ASHLAND, MASSACHUSETTS

BUILDERS OF PRECISION MACHINERY FOR 50 YEARS

WHAT'S NEW IN METALWORKING

LANDIS TYPE H 10 x 20" HYDRAULIC UNIVERSAL

THE Landis Tool 10x20"
Type H Hydraulic
Universal Grinder was
designed as an adequate
answer to the demands of
industries needing fully
universal machines to
turn out mass quantities
of small size, highly accurate, parts in Tool
Rooms—or on a production basis. Exact and
sensitive controls enable
it to produce continuously within very close tolerances with operators of
limited skill.

In general appearance this grinder resembles the popular 4"x18" Type H Plain Machine; the major differences are the universal wheel head and universal headstock.

Bed is of the rigid, box type, "clean-lined" design with integrally cast compartments for coolant reservoir, control, hydraulic and electrical equipment.

Bed design prevents headstock or footstock overhang at any position of carriage.

Vee and flat guides are constantly lubricated by a metered amount of filtered oil. This feature, together with full support of the carriage at all positions, makes for accuracy.

The headstock is driven by a constant torque type variable voltage motor. This self-excited motor has a work speed range of 90 to 600 rpm and drives the headstock spindle thru Vee belts to eliminate vibration. Starting and stopping are controlled by the work start and stop lever.

The headstock spindle and work drive



pulley are mounted on preloaded superprecision ball bearings. Face plate overhang is at a minimum and rigid support is given the work. Change from live to dead spindle is made quickly and easily by a convenient plunger,—the head swivels up to 90° for face grinding.

The grinding wheel head is mounted on a sub-slide and swivel base. It may be swiveled 90° either side of zero and may be moved 4" forward or back to obtain additional work clearance. All Vee and lat guides and swiveling surfaces are lubricated by a "one shot" system. A one hp constant speed dynamically balanced motor drives the chrome vanadium grind-

If it's a small part

turn it with Precision, Speed and Profit

on a

SHELDON



Engineered for precision shop and tool room work. Rigidly built to stand up and hold its close accuracy under round-the-clock operation. This is a quality machine tool in every detail, yet is moderate in price . . . a lathe that stands out far ahead of others. The lathe selected by U. S. Army, the Navy and the Marine Corps, for mechanized machine shop instrument repair shops,

Contact us or your local Sheldon dealer for prices, engineering data, deliveries, etc.

All SHELDON lead screws are cut on the finest Pratt & Whitney "Super-precision" lead screw machine.

BUILDERS of GOOD LATHES since 1919

- Bronze or anti-friction bearings
- · "1" Collet capacity
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- Double-walled apron
- Large hardened and ground spindle
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- · Convenient controls
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- · All Steel Bench

SHELDON MACHINE CO., INC., 4242 N. Knox Ave., Chicago 41, U.S.A.



Ask your operators what electric drill to buy. You'll find many will answer, "Buy me a 'Clark,' will ya?"

With men who use electric drills, the Clark drill stands supreme. Use this user experience as a yardstick in purchasing.

Clark

Jas. Clark, Jr. Electric Co. 614 Bergman St., Louisville 3, Ky. ing wheel spindle thru Vee belts. Landis Microsphere bearings are used.

The hydraulic system comprises a traverse cylinder, a direct connected motor driven vane type oil pump and control valves. Smooth uniform carriage traverse speed of 3" to 120" per minute is possible with reversal accuracy of within .001". Oil reservoir is in the machine bed.

HIGH PRESSURE MILLING

A new method whereby high pressure milling can be done without the use of the expensive cams formerly required has recently been announced by the Turchan Follower Machine Co., 8253 Livernois, Detroit 4, Mich.





It is explained that when forms are milled under heavy pressure, using hardened cams and rollers, the cams change in shape and wear out, necessitating frequent replacement. Thru use of a Turchan Hydraulic Follower Attachment, expensive cams can be replaced by soft inexpensive templates, at at material saving.

A typical example is the 16-foot wing spar shown, which is being machined on a special spar miller, one of the largest milling machines used in an airplane plant, reproducing the shape as outlined in the small illustration. By the old method, such a terrific pressure was exerted on the cam and roller that they had to be replaced at frequent intervals. With a Turchan Attachment, a soft template lasts indefinitely, and the milling is also said

A COMPLETE NEW LINE!

CENTRAL GENERAL GENERAL



WRITE TODAY FOR CATALOG #14



e The entire line of Individual Micrometers and complete sets illustrated and fully described. Write today to The Central Toat Ca., Auburn, Rhode Island. All frames farged of the finest special alloy steel . . The new improved polished frame Micrometers in 1" and 2" sizes . . The new black ename finish Micrometers in all sizes from 1" to 6" . . Also available with rachet stop, lock nut and 10,000ths graduations . . A full range of Metric Micrometers in addition to complete sets in addition to complete sets in leather covered cases—0" to 3", 0" to 4", and 0" to 6".

THE CENTRAL TOOL CO.

Micrometers of Cartified Accuracy

AUBURN · · · RHODE ISLAND

THE CHILD COLUMN THE WINDS

to be more accurate than was formerly possible.

The contour of the spar is reproduced

by means of a template, the pressure being regulated by the flow of oil in a hydraulic unit which travels with the head.

CINCINNATI SHAPER BUILDS HUGE PRESS BRAKE

Illustrated is one of the largest mechanical two housing press brakes. It was made by the Cincinnati Shaper Co., Cincinnati, Ohio, and has a clear span of 20 feet between the housings and an overall die surface, or bending surface, of 30 feet.

This particular brake was built for the American Rolling Mill Co. Middletown, Ohio and is capable of exerting a pressure of 1,000 tons. This can be translated intobending the property of the property of the property of the picture shows the machine bending 20 feet of \(^3\)/" steel plate cold.

The brake also is un-





QUALITY TURN HEAVIER DIAMONDS LOADS FASTER

FOR DEFENSE

We can supply you with EASTERN Quality Diamonds, known for their dependability, at the following attractive PRICES:



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These Diamonds can be supplied in any special holder or nib at the same price.

with IDEAL LIVE CENTERS

Get more work, quicker, out of lathe, millers, grinders, etc., with ETSCO Live Centers. They rotate with the work, and therefore permit heavier loads faster speed - deeper cuts. The radial load is carried by a high precision ball

bearing and thrust load absorbed by a taper roller bearing. All parts are hardened and ground.



TRIPLE DUTY







Three interchangeable center pieces (illustrated above) for all kinds of centered and uncentered

work. Save	s set-up time	e. Extra charge.	
Center	Morse	Cap. 100 r.p.m.	Net
No.	Taper No.	Rad. & Thrust	Price
1-MA	1	250 lbs.	\$20.00
2-MA	2	250 lbs.	20.00
3MA	3	250 lbs.	20.00
3—MB	3	400 lbs.	25.00
4—MB	4	400 lbs.	25.00
4—MC	4	600 lbs.	35.00
5-MC	5	600 lbs.	35.00
11/2-SC	Straight	600 lbs.	35.00
13/ 90	Straight	600 lbs.	35.00

EASTERN

Tool & Supply Co.

176 GRAND ST., NEW YORK 13, N. Y.

Tools of Distinction

We have in stock a complete line of Milling Cutters, Lathe Tools, H. S. Drills, H. S. & C. S. Taps and Dies, Lathe Chucks, Drill Chucks, Files, Special Taps and Dies.

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CERROMATRIX (Melting Temp. 250° F.) For securing punch and die parts, anchoring machine parts without expensive drive fits, short run forming dies and other metal-working applications.

CERROBLEND (Melting Temp. 158° F.) Used as a filler in bending thin-walled tubing to small radii, Easily removed in boiling water. Also used for aircraft assembly jigs, templates for forming dies and other purposes.

CERROSAFE (Melting Temp. 190° F.) Used to accurately proof-cast cavities such as molds, gun chambers, forging dies, etc., and many similar applications.

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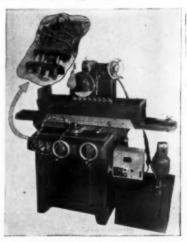
usual in that the four main members that is, bed, ram and two housings, are each said to be of the largest rolled steel plates in the world for all practical purposes. These plates were produced by the Luken Steel Co. at Coatesville, Pa. The machine has a dead weight of 250,000 lbs. in round figures.

In connection with these machines, a 64-page catalog, B2, has been published showing many different types of jobs which can be performed. These pictures are especially interesting because details of the dies are shown for a wide range of jobs. In fact the range is so great that this handbook of press brake technique will, in many cases, suggest ways and means of solving tough production problems.

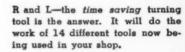
"FIVE-IN-ONE" VALVE

A new "five-in-one" hydraulic control valve has been incorporated in the DoAli G-10 Surface Grinders to provide—increased speed, efficiency, simplicity of operation, and higher accuracies. This new machine tool is claimed to grind a surface with precision to 6 micro inches.

The G-10 has a variable table travel of 0 to 50 feet per minute with a cushioned reversing action operated by the pilot valve to give smooth, long life performance. To accomplish this, two valves are necessary:—(1) table control valve and (2) table reversing valve.







It can be changed from right to left or left to right in 10 seconds. The only tool on the market of its kind.

No wasted time in set-up; performs many operations at once, such as: turning shoulder concentric with

stock diameter; turning two diameters while drilling or reaming; turning one diameter-chamfering two corners, facing end of part along with drilling or reaming; turning and forming special shape or end of part while drilling or reaming; drilling and chamfering; pointing work concentric with turned diameter. Write for detailed information.

R AND L TOOLS

1827 BRISTOL ST., NICETOWN, PHILADELPHIA, PA.



Hilliard Centrifugal Clutches and Couplings have a minimum number of parts and a wide range of adjustment. They are ideal for high speed dual drives, automatic engagement on internal combustion engine drives, starting high inertia drives, and many other purposes.



Hilliard Friction Clutches and Couplings are especially suitable for drives requiring smooth clutching and infrequent clutch adjustment. Their rack and gear mechanism permits very slow engagement of friction surfaces, resulting in extremely smooth load acceleration, always under control.



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For the new series of 6 illustrated Bulletins fornished FREE upon request. Featuring our complete line of Industrial Clutches and Couplings—Over-Running—Single Revolution—Friction—Contribugal—Overload Release—Sip.

THE HILLIARD CORPORATION
26 W 4th St. ELMIRA N Y
Manufacturers of
INDUSTRIAL CLUTCHES

The crossfeed action (indexing at end of table travel) is actuated by a hydraulic cylinder and can be controlled in infinite settings from .004 to 200" depending on the work being done. The crossfeed or traverse action in addition to hydraulic operation is also actuated by an accurate screw located in center of cross travel ways and can be held to split "tenths of a thousandth" for close tolerances on form and tool grinding with manual operation.

When the automatic crossfeed is used for sharpening dies or any flat grinding to size, the crossfeed screw or manual drive is disengaged by a hydraulic cylinder. Thus accuracy of the crossfeed screw for form grinding will last over a

longer period of time.

To obtain the required motions, three components are necessary:— (1) Selector valve. This valve has three positions: (A) Manual Crossfeed; (B) Automatic Crossfeed, and (C) Wheel dressing or rapid traverse.

Operation of this valve is independent of table action so that either automatic crossfeed can be used for flat grinding or the manual crossfeed for form grinding. The manual crossfeed can be used with the table operating automatically or manually. Rapid traverse is used for dressing wheel and moving work up to wheel after placing work on chuck.

wheel after placing work on chuck.

(2) Crossfeed control. This valve is used to control amount of crossfeed or indexing at each table reversal when using automatic crossfeed and can be controlled

to feed from .004 to .200.

(3) Crossfeed directional valve. This valve is used to control direction of crossfeed in automatic position and has a "neutral" position for stopping carriage while in the automatic position for locating work, etc. This position is also employed when using the manual crossfeed as a bypass for crossfeed hydraulic cylinder. It also serves as a limit stop. Adjustable trip dogs are provided so that cross movement can be set for any amount of travel to guard against the wheel running into shoulders of the work, guards, etc.

It is well to remember that a surface grinder is a "finishing" machine. All of the accuracies employed in previous machining operations are completely lost if the finishing machine does not perform accurately. A surface grinder requires operator's attention to the work piece. Simplified positive acting controls allow him to keep his eye and his mind on his work without thinking of complicated

machine controls.

Complete information is available from DoAll International Co., 1301 Washington Ave., S., Minneapolis 4, Minn.



NO. 601—RAPIDUCTION LATHE

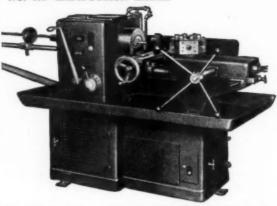
An improved hand screw machine with multi-speed motors has been developed by Oster Mfg. Co., 2015 East 61st St., Cleveland 3, Ohio.

Known as the No. 601 "Rapiduction", the machine is developed to meet a wider range of conditions than formerly. New 4-speed motor permits four speed changes without altering of sheaves. Can also be furnished with 2-speed motor.

Motor is mounted on oil-resistant rubber to insure smooth,

quiet operation. Coolant pump has its own % hp motor to provide uniform lubrication independent of spindle speeds.

New electrical controls have speed selector switch located conveniently for oper-



ator. Longer base of heavier construction is said to insure increased rigidity of machine. Automatically indexed, six-position turret is optional with plain saddle.

Capacity is 11/2" round bar. Swing over

CARBIDE



NOW . . . RAPID DELIVERY

ON STANDARD REAMERS—CENTERS AND SCREW MACHINE REAMERS!

Accuracy and skilled workmanship are assured in Schmarje Carbide Tipped Tools . . . Try them and see.

ORDER TODAY FROM - -

SCHMARJE

TOOL AND ENGINEERING CO.

MUSCATINE, IOWA

QUICK CUTTER CHANGE Cuts Hole Costs



1 Loosen lockscrew "a" and adjusting screw "b." Cutter can now be slipped from bar.



2 New cutter immediately is inserted in its place and float of cutter set by "b."



3 Tighten lockscrew "a" and work is ready to be resumed with sharp cutter.

A sharp cutter can be inserted in a Madison bar without disturbing the original set-up in a matter of seconds. This effects more economical reaming operations in many ways. First, because cutter changing with Madisons is so swift and simple, you keep a sharp cutter in operation at all times. This assures more continuously uniform work, and closer tolerances held, at higher speeds. Danger of overheating, and the possibility of damage to the tool or the work is eliminated. Second, tool maintenance is decreased. Forcing a dull cutter into the work generally results in damage. Chipped or burned out edges call for increased grinding and waste of cutter stock. A cutter changed at the proper time, however, needs only a light dressing up of the cutting edges. Third, sharp cutters assure better reaming operations in metals that do not run uniform. Sharp tools, as well, operate more efficiently in the hands of "green" help.

Add these advantages to the other Madison features of onescrew adjustment and controlled float, and you have the reasons why Madisons help you lower final costs by reducing reaming time on every hole.

Write for the new Madison catalog . . . Shows complete lines, prices and grinding instructions.

MADISON

MANUFACTURING COMPANY

DEPT. B-1



May, 1945

SMALL BUT MIGHTY



Yes, small in the amount of tool crib space they occupy, but a MIGHTY tool when put to the task of removing a broken tap. Walton Tap Extractors get at those broken taps and complete the job without loss of valuable time.

EXTRACTORS

Simple and easy to operate.

List Prices from \$1.50 to \$5.00 each.

Immediate Delivery!

Write for Folder No. 12.

The WALTON Company
94 ALLYN STREET · HARTFORD, CONN.

bed is 14"; over cross slide, 6½". Various optional features make machine adaptable to individual requirements.

WG-4 WET BELT SURFACER

Now the advantages of Wet Belt Machining may be applied to line contact grinding and polishing as well as platen machining in a new unit developed by Porter-Cable Machine Co., 300-2 Exchange St., Syracuse, N. Y.

Much has been achieved in increased production per man hour and in the economy of operating thru the use of abrasive belts. Many jacks have been converted to the use of the abrasive belts by installing idlers to which the abrasive belts run. The operators work on resilient wheels over which the abrasive belts operate. Bench type units, including the idlers, have also become popular on both line contact and platen grinding.



Reasons for increased production and economy are several, i. e.:—the abrasive on the belt is exposed for action; the resiliency of the contact roll permits abrasive to dig in and get the job done quicker; the resiliency eliminates chatter, and since the abrasive belt, a uniform factory product and contact roll are balanced, the results are easily controlled.

An accurate platen is located immediately above contact roll, convenient for grinding flat and square after removing stock over contact roll.

1 Modernize Your Machine Tools 2 Slask Operating Costs 1000 MOTORS AND DRIVES



SEE WHAT THESE LEADING USERS

White Motor Cleveland Cap Screw Cutler-Hammer Republic Stamping Valley Mould & Iron H. B. Sacker Mig. Co. Thompson Products



Investigate At Once What Torq Can Do For You

Torq Electric Motors and Torq-qua-matic Drives mean modernized, more efficient equipment for you — and that means lower operating costs now and after the war. Inquire at once and learn how we can help you lick your machine tool conversion problems. ELECTRIC MOTORS—totally enclosed, fan-cooled, anti-friction bearings. TORQ-QUA-MATIC DRIVES—4 selective speeds, 1 to 15 H.P., alloy steel gears, anti-friction bearings.

PROMPT DELIVERIES: Both motors and drives are available for speedy delivery.

SEND QUICKMAIL
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CATALOG



THE TORQ ELECTRIC

6605 CARNEGIE AVE



MANUFACTURING CO

CLEVELAND, OHIO

Modern Machine Shop Practice Requires



DRIVE OUT THE "WOBBLIES"

Of Couple Force Action

◆ Longer life and greater efficiency of all rotating parts is a MUST in post-war product design. Bear Dy-Namic Balancing Machines enable you to get rid of efficiency-destroying WOBBLIES, faster, easier and at lower cost, both on the products you machine or manufacture, and on your own production machinery. Bear's wide range of models, in all types and sizes, brings Balanced Precision to shafts, wheels, gears, blowers, armatures . . . even railroad car wheels . . . all rotating parts from 4 oz. up to 4000 lbs.!

THE NEW BEAR BULLETIN brings you the facts about Dy-Namic Balance . . . shows the complete range of Bear Balancers, each especially designed to meet specific balancing problems. Write, usire or phone details of your problem, and send for your copy of the new Bear Bulletin today. Address Bear Mig. Co., Dept. MTB, Rock Island, Illinois.

BEAR DY NAMIC BALANCING

However, heretofore, line contact grinding and polishing was available only in dry machines. The heat and dust caused many complaints and costly delays. The dust was injurious to health and equipment. The heat generated caused distortion, warping, checking, cracking, etc.; it also turned over burrs.

Wet Belt operation eliminates these disadvantages. The cool operation speeds cutting, prevents loading of belt, eliminates burring operations.

The new model WG-4 is especially useful for cleaning up sand and die castings, for locating register. So the WG-4 saves time in the jobbing machine shop, tool room, repair shops and the laboratory and experimental departments as well as on production.

The 4" belt works a considerable area, while the 1½ hp motor supplies ample power.

The WC-4 is equipped with a self-contained recirculating system and individual motorized pump.

SCHAUER SPEED LATHE



Providing a unique and advanced method for polishing and finishing cooking utensils, bowls, kettles, reflectors and similarly-shaped articles, this new, heavyduty, variable-speed Lathe, with vacuum holding fixtures, permits speedy, simultaneous polishing of entire surface of the object, with an even lustre. With this machine, the part is revolved, instead of bringing it up against a revolving abrasive or polishing wheel. The part is capable of handling a wide range of vacuum-type holding fixtures, each designed for the particular object to be held.



development of modern lathe chucks. We worked closely with the machine tool industry through every step in the establishment of the new standard types of spindle noses and the standardization of jaw equipment. Meanwhile . . . and especially during the tool-up for war production... we have constantly been called upon to design and supply special work-hold-

ing equipment for many difficult applications.

This background of experience can be most helpful to you in preparing NOW to speed your reconversion to peacetime production. Consult us. Perhaps we can suggest ways to save set-up time, reduce tooling cost and produce more economically.

The Cushman Chuck Co., Hartford 1, Conn.



WORLD STANDARD FOR PRECISION



The O. W. Center Scope



If it were possible for you to look straight down thru the center of your spindle shaft — you would see the job exactly as you see it thru the

CENTER SCOPE

A NEW LOCATING TOOL

which will locate any layout no matter how fine the lines may be and center it accurately to the axis of the spindle on any vertical or horizontal machine tool.

SIMPLICITY

Insert instrument in spindle of machine tool—vertical or horizontal boring mill, drill press, lathe or jig borer.

SPEED

200-1000 rpm—Bring thumb nail to bear against centering bead until it runs true. Stop machine and focus on work.

ACCURACY

Locate cross lines on work to match lines in viewing aperture. IT'S JUST THAT SIMPLE.

WRITE FOR FURTHER

CENTER SCOPE PRODUCTS
3829 San Fernando Road
GLENDALE 4, CALIFORNIA

Continuously operating motor; single pedal control of clutch and brake; large, disc-type brake, (for extremely fast stopping of the spindle), are features contributing to a high rate of production.

Motor is coupled to work spindle thru a Twin-Disc clutch assembly and Reeves variable-speed drive. Infinitely variable speeds—from a minimum of 100 to a maximum of 4800 rpm, in a ratio of 6 to 1—or 12 to 1 are available.

This Speed Lathe is known as Type VA3BC-V, and is made by Schauer Machine Co., 204 Reading Rd., Cincinnati, O.

GRINDER WHEEL CRUSHING

An electrically powered crush dressing device for forming the wheel on the Precision Thread and Form Grinders made by The Sheffield Corp., Dayton, Ohio is available in two styles, either of which can be applied to new machines or to those now in use.



With model A, the operator presses a button after crusher roll has been manually lowered into contact with grinding wheel which is made to revolve at grinding speed. Coolant flow is directed over crusher roll at the same time it is powerfed into the wheel at a constant rate until feed indicator dial on crushing device shows that the desired depth of dressing has been reached. The operator who has



STATE

Adjustable Tools for Precision Boring

The STATE Dial-Set Boring of his two parts. Holder consists of a short and body. Insert consists of an emission, one, a knurled vernier, and a set it is hich a standard bit is held by one cree. Cone fits into socket of corresponding to tour in holder, being held by the pine and setscrews. One holder account atts a series of inserts.

series of inserts.

Kit includes holder and four as irts.

Micrometer adjusts boring a meter from

.000" to .050" in graduation of 001".

This shows how cone is retained in holder. Note simplicity and strength of construction. Micrometer permits fine adjustment of boring diameter. Insert can be changed without disturbing set-



Extension of bit gives additional increases in diameter. Boring ranges of the four inserts are: A-1, $\frac{1}{2}$ 10 $\frac{1}{2}$ 1 A 2 $\frac{9}{16}$ 16 $\frac{1}{2}$ 17. A-3, $\frac{13}{16}$ 16 to $\frac{1}{2}$ 17. A-4 1 $\frac{1}{2}$ 16 $\frac{2}{16}$ 17.

The cone and socket principle affords these advantages: smaller in vit because it is solid; unusual rigidity; freed a from chatter; positive accuracy; in schange of inserts; standard bits; low ca

Original bits furnished with tools. Replacements obtainable from any tool supply house.

Ask for literature and quotations on STATE Dial-Set tools and kits. Information will also be furnished on STATE Four-Cutter boring, drilling, and reaming tools. Write us now while you're thinking of if.

STATE MFG. & CONSTR. CO.

1949 N. Dixie Hghwy, Franklin, Ohio

watched the operation releases pressure on push-button, thus stopping the wheel, crusher in-feed, and flow of coolant. He then lifts crusher out of wheel engagement and grinding of the work continues.

Model B is semi-automatic and differs from Model A in that the feed dial indicator is preset for a desired depth of automatic in-feed of crusher roll. After removal of wheel guard and lowering of crusher roll in contact with wheel, the closing of an electric switch starts cycle of coolant flow, crushing wheel speed, and feed of crusher into the wheel. The automatic cycle continues until desired depth of in-feed is reached, at which point coolant, in-feed of crusher, and rotation of grinding wheel are automatically stopped. Operator then manually returns crusher roll to upper position and continues with grinding of the work.

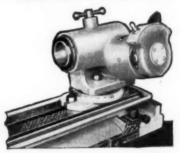
These power crushing devices have many advantages over manual crushing including reduction of dressing time by 50% and increased life of crusher roll due to uniformity of crushing and smoothness of in-feed. More parts are obtained per dressing because wheel is always formed under identical conditions of in-

feed and pressure.

Model B has an additional advantage of keeping amount of stock removed from

Model B has an additional advantage of keeping amount of stock removed from wheel to a minimum, since the human element is entirely removed from actual wheel dressing so both wheel life and crusher life are held to a maximum.

MOTOR DRIVEN WORK HEAD



The K. O. Lee Co., Aberdeen, S. D., is now in production on a newly designed Be-643 Motor Driven Work Head. It is built for use on any make of grinder, large or small. It is constructed with No. 11 B & S tampered spindle, mounted on ball bearings, hardened and ground, and is designed to receive chucks, collet fixtures, face plates, centers, etc.

Save VALUABLE Lumber



CARTER

. . . installed and focused with your rip-saws. cast a definite shadow-line on the material to be sawed, showing the exact path of the saw ahead of the cut . . . permitting sawyers to cut close to flaws, saving valuable lumber, avoiding scrap and saving later operations.

CARTER LIGHTS are praised by manufacturers of show-cases, furniture, caskets, boats, ships, plywood and plastic products, boxes, general lumber and millwork plants. Send for circular.

CARTER PRODUCTS COMPANY

960 Michigan Trust Bldg., Grand Rapids 2, Mich.

FEATURES which Benefit You!

- 1. Saves Valuable Lumber
- 2. Increases Output
- 3. Reduces Waste
- 4. Operated by Limited **Experience Sawyer**
- 5. Simply Constructed
- 6. Costs ic per hour for electricity
- 7. Used by furniture plants, ship-yards, box makers, general lumber, plywood and plastics shops.

Band Saw WHEELS . TIRES . GUIDES . GUIDE LIGHTS

PALMGR

ANGLE-DRILL PRESS PRODUCTION VISES

ANGLE VISES





DRILL PRESS VISES

11/4"-21/4"-4" Jaws



Accurately machined, Best semi-steel castings, Long hearing adjusting screw. Jaws hardened steelplain or grooved.

VY DUTY PRODUCTION VISES

3'-4'-6"-8" Jaws



For fast heavy work. Adjustable cam locking lever. Movable jaw, hardened and ground.

FLANGED MILLING MACHINE VISES Heavy Duty 6" Jaws



Clamps to table of milling machine, grinder, etc. Jawshardened and ground 6" wide, 2" deep.

No. 250 MILLING ATTACHMENT VISES For 8"-9"-10" Lathes



WRITE FOR CIRCULAR 348

CHICAGO TOOL and ENGINEERING CO. Mirs of PALMGREN PRODUCTS for over 25 years \$388 South Chicago Avenue, Chicago 17, III.

The built-in Universal motor is provided with conveniently located reversing switch, regardless of position of work table or rotation of work. Motor is fully protected from dust and from any oil entering from working parts. The unit is quickly and easily mounted and is held in position by two T-slot bolts at any convenient spot on table.

Fixture is mounted on a detachable swivel base which is graduated in degrees (45° either side of center) and permits full 360°, swivel if desired. Swing over table, with swivel base 8½"; without swivel base 6½" The unit measures 7" in width, 6½" in length and 7¾" in height and weighs 20½ pounds. Write for bulletin No. 31 WH.

INDUCTION BRAZING



Here is a new 24-station circular indexing carrier mounted on an 18-Kw electronic high-frequency generators to braze metal assemblies. A complete assembly is ejected from the carrier each 12 seconds. The operator's activities are limited to loading the stations as they come around empty. Heat is applied by a set of three water-cooled induction coils located under three of the work positions. The coils are followed by the vertically-operating ejecting mechanism. Carrier drive is by a small motor.

Application of the carrier can be made on any of the company's electronic gen-

LMORE DIAMONDS SATISFY



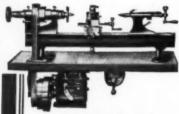
F. F. GILMORE & CO.

285 Columbus Ave.

Boston 16, Mass.

THE OStark".

PRECISION NCH LATHES



With Motor Drive Unit (9 Speeds)

Dependable for long service on exacting work which they handle with facility and speed. Records of 20 years continnous service are not unusual.

Write us your requirements. Now 4 good sizes, 1/4", 1/2", 3/4" and 1" collet capacity.

Stark Tool Company

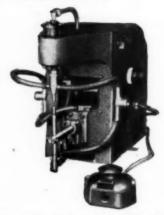
Established 1862

Waltham, Massachusetts

Originators of the American Beach Lathe

erators with ratings of 5 to 100 Kw depending on the heat-input requirements of the work. Normal output of the unit is at 200 to 600 kilocycles. The maker is Scientific Electric Div., "S" Corrugated Quenched Gap Co., 107-119 Monroe St., Garfield, N. J.

MIDGET SPOT WELDERS
Two new bench type Universal Midget Automatic Spot Welders are now available for precision welding of light metals; U.S.P.1 (1 KVA) and U.S.P.3 (3 KVA) with built in automatic weld timer or with separate timer panel for stitch welding: automatic repeat pulsation welding or synchronous I cycle timer. Welders are equipped with water-cooled transformers, electrodes and tips and are air operatedcontrolled by foot switch or solenoid valve and pressure switch.



Descriptive bulletin is available from Interstate Machinery Co., Inc., Distribu-tors, 1431 W. Pershing Road, Chicago 9. 111.

LASSY TAPPER

Designed for economical hand tapping on a production basis a new tapper is offered by Lassy Tool Co., Plainville, Conn.

An instantly adjusted gage ring on the spindle and a scale besides the main bearing takes the guessing out of tapping depth. It eliminates need of retapping holes and the time lost in overtapping. There's no freezing of taps in blind holes.

Instantly adjusted stepped holding bars grip the work firmly and prevent tap

DO YOU KNOW THE TRUTH About Hardness Testing?





The new Clark catalog is more than a catalog.

It is a 20-page reference manual on the history, theory, practice, and equipment for modern, scientific hardness testing. Printed in two colors, size 8½"x11", it is available without charge to manufacturing executives. Just drop a line on your letterhead to Department BB, CLARK INSTRUMENT INC., 10200 Ford Road, Dearborn, Michigan.

FLOOR PATCH

TAKES TRAFFIC

NO WAIT FOR SETTING

Here's a new, fast way to patch broken concrete without having to close off the area. Use durable INSTANT-USE ... a tough, plastic material which you simply shovel into hole-tamp -and run traffic over immediately. NO WAIT-ING. Bonds tight to old concrete, Makes smooth, solid, heavy-duty patch. Keep a drum on hand for emergencies. Immediate shipment.

Request Descriptive Folder and Details



FREE TRIAL OFFER





FLEXROCK CO.

3634 Filbert St., Philadelphia 4, Pa.
Please send me complete INSTANT-USE
Information . . details of FREE TRIAL OFFER
—no obligation.

Name	**************************************
Compan	y



breaking. They lock and unlock by hand with lever screws and require no wrenches. Small workpieces may be tapped without a vise.

It is possible to change taps in a jiffy. The tap is snapped out and the new one snapped into the spindle. The adapters are easy to handle and are hardened and ground to a precision fit. Tap is locked in a broached square with a set screw and is driven by the square of the tap. The adapter driven by a ½x½" tongue is held in place by a spring ball. The standard Model No. 12 handles taps ½ to 1" inclusive. Height table to floor is 30" and the table is 18x20x3". Weight is given as 152 lbs. There are many other interesting and attractive features disclosed in a new bulletin which will be sent on request.

SHEFFIELD HOLE CHECKER

A new Model N-5 Internal Measuring Instrument announced by The Sheffield Corp., Dayton, O. embodies both mechanical and electrical principles and is sometimes referred to as a "hole checker". This comparator type instrument for precision measuring of internal dimensions is equipped with an electric gaging head known as the Electrigage.

A new type of electrical magnification

A new type of electrical magnification causes instantaneous action of the indicator hand, thus giving a quick, positive reading. There is no lag, and the stylus has a feather toucn so that gaging presA Complete Service at One Source

EVERYTHING....

From the First Line on the Drafting Tables to the Finished Product



Whether it is

tools to produce, or the production itself. We work from rough idea. Part print — sketch — or just talk it over with us. Inquiries will bring prompt quotations.



Tools — Dies — Jigs — Gages — Fixtures — Special Machines—Production of parts in large quantities — Production of assemblies from raw material to finished product. — In addition to our own equipment we have ex-

tensive subcontract outlet. AWARDED APRIL 7, 1943

EAGLE TOOL & MACH. CO., INC. 1101 and 1925 W. Main St., SPRINGFIELD, OHIO

ENGINEERING . DESIGNING . DEVELOPMENT

QUADRILL THE NEW THE NEW THE NEW THE NEW THE NEW THE NEW



4. DRILL PRESSES IN 1

- Rigid Alignment—Strictly Accurate
- Easily Attaches to Quill of Press
- Quick Indexing
- Finger-Tip Control Changes Positions

Multiply drill press production 4 times with the new QUADRILL. Attaches directly to the quill of most drill presses. Three drills remain stationary for safety while only drill in work position operates. Actually converts a single drill press into four. Does away with moving work from press to press and reduces frequent changes of tools. Saves floor spaces. All this and more. Write for complete details and prices today.

Sold on positive money-back guarantee,

D.R I L L E T CORPORATION 919 N. MICHIGAN AVE., CHICAGO 11, ILLINOIS sure need never exceed three ounces. A fine adjustment knob is used in obtaining a zero setting. An automatic stabilizer prevents ordinary voltage variations from affecting accuracy of the readings. Precision blocks or masters are used as

Precision blocks or masters are used as a reference in setting up the instrument. A limit switch arrangement operating two red signal lights assists operator in making set up and in positioning work for checking.

Gaging range includes minimum and maximum gaging diameters of 370" and 12" respectively. Surface plate is adjustable vertically, giving a gaging from surface plate to center of diamond points of 1/16" to 1½" depth of hole that may be checked. It is possible to explore a hole 3" deep thruout for diameter, taper, bell mouth, and out-of-round conditions. Capacity is sufficient to accommodate an A.G.D. ring of the largest size.



Instrument can also be supplied with special gaging arms for checking holes down to and including 240" in diameter. Maximum gaging depth from surface plate to center of diamond points on these arms is 1".

All critical and exposed parts are chrome plated for longer life, Tungsten carbide is used at points of contact to minimize wear.

Linear scale is of the balanced type having a total range of .0012". Distance between the smallest graduations representing .00005" is approximately ½" so that interpolation to .000025" or less is easily accomplished.

GRINDING SAFETY

A bench grinder in a busy industrial plant recently was equipped with eye

Showing Highest Quality Measuring and Checking Equipment



SURFACE PLATES

Over 50 sizes, ranging from 7 x 71/2 to 96 x 192.

SLOTTED ANGLES

In 19 sizes, ranging from 4 x 9 x 5 and up-in both scraped and ground finish.

In 15 sizes, ranging from 3 x 4 x 12 and up - in around finish.



UNIVERSAL ANGLES



In 10 sizes, ranging from 4 x 3 x x 5 and up - in ground finish.

Special sizes made to order.

Also, measuring angles, angle plates, vee blocks, straight edges, boring mill parallels, steel parallels, cylinder squares.

KNOBS WHEELS LEVERS

Ready for immediate shipment









Send for complete catalog

WE RESCRAPE SURFACE PLATES AND REPAIR ANGLES, CUBES, ETC.

MACHINE PRODUCTS CORPORATION

6767 E. McNichols Road

Detroit 12, Mich.



The Bantam has all the features you want for daily use on grinding, polishing, buffing, drilling, carving, and many other shop operations.

- · Simple in design
- · Sturdily made
- · Non-breakable, steel case
- Fingertip switch
- · Operates on 110-115 Volt AC-DC
- Speed—approx. 20,000 RPM
- Internal ventilator fan
- Balanced armature and standard type field
- · Weight only 15 oz.

Write today for catalog page and list of accessories.

Small Motors, Inc.

1310 ELSTON AVE., CHICAGO 22, ILLINOIS

Manufacturers of special small universal, fractional H.P. motors, dynamotors, shaded pole mators, heater motors, generators.



shields of the type illustrated. It just happened that the grinding wheel had not been set up properly. While the grinder was in use (at a rated speed of 3400 rpm), the wheel cracked and two parts flew into the air. Serious injury to the operator was averted becated the eye shield was on guard and intercepted the flying sections of grinding wheel before any damage occurred. Sure, the glass in the eye shield was shattered, but that is replaceable. A man's eye isn't! These shields are offered by Stanley Electric Tools, New Britain, Conn.

MASTER TAPER ATTACHMENT A taper attachment of simplified design is announced by Master-Taper Co., 126 N. Clinton St., Chicago 6, Ill.





EXCLUSIVE FEATURE

The "Uni-frame" construction of WELCO Torque Motors provides for an easy interchange of A.C. and D.C. motors to fit the same housing or frame. Only WELCO has this vitally important feature.

Custom-tailored suits are made to meet the special requirements of the man to be fitted. The result is peak perfection in dress.

Custom-built motors, likewise, are built to meet the special requirements of appliances, machines and devices. The result is peak efficiency in operation.

That is why WELCO Torque Motors are so much in demand by the manufacturers whose products require the special powering that standard motors cannot provide. A WELCO Torque Motor, specially built for your special powering requirements, will give your product the advantage of peak efficiency—top performance. We build them up to 75 H.P.

Our engineers will gladly consult with you regarding your special powering problems. Write Today.

THE B. A. WESCHE ELECTRIC CO. 1628-2 VINE STREET CINCINNATI 10, OHIO



If it's milled on a DIAMOND.. you can bet it's ON The Money

Built-in accuracy with smooth, troublefree, performance... that's what you get in DIAMOND milling machines! Engineered with tapered roller bearings on spindle, oversize power units, variable speed drives or multipulleyed drives, dual vee belts to transfer maximum power for heavy cuts. Accessories for all milling necessities. NO STALLING IN WORK, NO CHATTERING—just smooth, accurate, fast performance!

NEW MODEL M-26. Super-heavy, rigid construction for quantity production of medium-sized parts. 73 r.p.m. to 1200 r.p.m. continuous speed range. Toble size 5½" x 26". Travel 15" with power feed; 13" with rack and pinion feed.

Other Diamond Mills Available, Write for Folders

NO PRIORITY
REQUIRED!
Addresses seemly 4 weeks or less



Manufacturers of the DIAMOND Line of Precision Milling Machines and Accessories

It is designed to make accurate taper turning, boring, threading, etc., as easy as straight line tool operation. It may be used in any position on lathe, and does not interfere with straight turning. The sliding fixture has straight gibs eliminating vibration and tool play.

Graduations are in inches at one end, and in degrees at the other end of the swivel bar. It tapers up to 3½" per foot, 16½ maximum in either direction, 7½" in length at one setting. It duplicates tapered parts perfectly for accurate production. Can be attached or removed in minutes. Sturdy construction with adjustments efficiently compensating for wear, assure dependability in long use.

It is accurately fitted to each lathe of the listing:—Logan 10°, Atlas 10°, South Bend 9°, Sheldon and Clausing, Taper attachments for other lathes are manufactured to order.

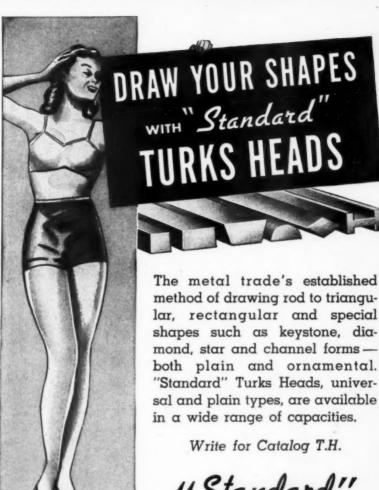
TRIPLES GUN PART OUTPUT

It is reported that use of "lead-screw" tapping machines with floating tap holders and simple non-clamping fixtures has enabled Flint Manufacturer's Service Co., Flint, Mich., to increase production of retraction levers for 50 caliber machine guns by 180%, decrease rejects, and lengthen life of taps some 25%, using unskilled women operators.



The particular job involved tapping of a 7/16-20 NS thread %" deep to a Class 3

DIAMOND



"Standard"

1555 Elmwood Ave.

Providence 7, R. I., U.S.A.

Export Dept.: 1111 South Ferry Bldg., New York 4, N. Y.

MEERALL

Multi-Wheel Numbering



Machine Model 70

The most efficient method of stamping numbers into metal. Repeats the same numbers until changed. Stamps numbers, etc., quickly . . . neatly. Perfectly aligned. Much better marks are produced by these machines than by single stamps or steel type, and at a far lower cost. Shank for Hand or Press and with any number of wheels from 3 to 20,

> Write for Bulletin BB-70.

Model No. 70 **Automatic Indenting** Numbering Head Model 50

Automatic indenting numbering head for consecutive or repeat numbering. 1/32" up to %" high figures can be furnished in sharp face Gothic or shaded Roman figures. Prefix or suffix letter wheels. Bench, foot, or



NUMBERALL STAMP & TOOL CO

HUGUENOT PARK STATEN ISLAND 12, N.

nt in the retraction lever, which was forged from tough SAE 1050 steel. Each part has one tapped and one reamed hole. The lead-screw tapping machine used is a "Detroit" Light Duty LTM-16 model produced by Detroit Tap & Tool Co. Using a tapping speed of 400 rpm, a production of the control of duction of 450 pieces per machine per hour was consistently obtained, tripling previous production. This speed is equivalent to an overall average-floor to floor of 8 seconds per piece. Such speed was due, in part, to the fact that high pre-cision control of the tap eliminated all necessity for holding work piece on return stroke.

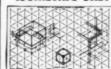
Use of locating pins on the simple platen fixture made easier positioning of work and rendered it unnecessary for operator to clamp down each piece, Positioning was further simplified and loading and unloading materially speeded up by the .010" float in fixture. Centering troubles were also practically eliminated by action of the floating tap holder which compensated for tolerances in the positioner by following the tapped hole without end play thru the complete cycle of

tap, return, and stop. In addition to producing smoother, better-appearing threads, use of the "Detroit" machine is said to have eliminated re-jects due to lead errors. This high degree of accuracy is credited to the unique lead-screw drive. With this lead-screw drive, the power takeoff is between the lead-screw and the spindle permitting the

lead screw to function as a lead guide only. Thus, the lead-screw is not subjected to the force which drives the tap. WESTERN TRANSMISSIONS

A new 6-page bulletin has been issued by the Western Mfg. Co., 3400 Scotten, Detroit 10, Mich. There are numerous illustrations of different machines, showing a wide variety of applications of Western Transmissions. These transmis-sions are available for one to 30 hp motors.

ISOMETRIC SKETCHES ARE



EASY TO MAKE

AND READ !

One trial will make you another steady user of WADE'S ISOM-ETRIC blue lined

paper. Shows all surfaces and interior to scale. Makes clear blueprints. Saves time daily in hundreds of plants. Write for Circular. 1422 E. 109th St. Dept. H.

hese Globe products do precision work

Compact, Rugged Construction, Low in Cost! Immediate Delivery



GLOBE HEAVY DUTY BED TURRETS. Adaptable to any lathe. Precision built. Rugged con-

struction.

GLOBE MILLER makes a milling machine out of a lathe in three minutes. Does all types of precision milling. Increases swing of 10" lathe to 16". Uses all lathe speeds. Used extensively by the U.S. Government.

GLOBE CROSS SLIDE. Adaptable to any lathe. 31/2" travel. Rugged construction.



IMPORTANT: When ordering or requesting prices on above items, he sure to give: 1. Make and model of lathe, 2. Lathe swing, 3. Power or hand cross feed, 4. State if lathe is equipped with telescoping taper attachment,



MILLING VISE (below) with replaceable jaw plates. Jaws 31/2" wide, 3" opening, 1%" deep. Larger sizes avail-

DIVIDING HEADS. Precision built. Various sizes available



Milling arbors, 4", 8", and 12",

produces precision parts at high speeds, low cost. Ball Bearing Head-stock. 10" swing. 1" capacity, 12 speeds up to 3126 RPM. Exceptionally rugged construction.





WORK HOLDING FIX-TURES, hold work of various shapes for milling, drilling, shaping or

End Mill Holders. Various sizes.

Detailed literature free upon request.

Address Dept. TB

3380 Robertson Blvd., Los Angeles 34, Calif.

GLOBE PRODUCTS MANUFACTURING CO.



Accuracy, uniformity and precision are assured in grinding both Acme 29° and National 60° left or right hand threadtaal bits, with ar withhout rake on the cutting face. No graduated scales or maving parts to wear out Two sizes,

camplete with adapters: Model A for the mechanic's tool kit \$16.75... Heavy Duty Model B for the shop \$35.00.



Fixture can be easily clamped to work table when magnetic chuck is not available.

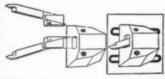


Diagram shows how to grind 15° right and left hand bent tools with standard adapters.

For complete information, call your Clark Cutter Jobber today, or write for catalog MTBB-5-GF



IND SANTA MONICA BOULEVARD

BEVERLY MILLS CALLEDS



PUNCH PRESS SPEEDS TUBE PRODUCTION—Loretta Roff considers it a good day's work to punch out 14 or 15 thousand deflection plate supports at the Dobbs Ferry, N. Y. plant of North American Phillips Co., Inc. These stainless steel parts are used in all types of cathode ray tubes that the company produces for war industry these busy days.

TYPE 230 HOLDEN FURNACE

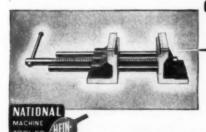
An interesting 4-page folder has been issued by The A. F. Holden Co., New Haven, Conn. Specifications are given for a combination tool steel and high speed hardening unit and an illustration is shown. The Holden heat treating baths are listed with their respective melting points, operating ranges and uses.





THE HEINRICH HEAVY HANDNIB

A combination Nibbling, Shearing, Rod Cutting and Punching machine... mounted on a swivel base... a real short-cut to irregular shapes. Ideal for cutting templates, trial blanks and experimental work better and in one-tenth the usual time required. Capacity: Nibbling and Shearing 3/16" flat stock... Punching Holes up to ½" in ½" sheets... Rod Cutting 3/16", ¼", 5/16" and ¾" round bars.



A HANDY DRILL PRESS VISE

Built-in Parallels

No interference from chips or burrs Use it on three sides

Special V-Groove for round shafts
Through Drilling without damage to

.....

WRITE FOR DESCRIPTIVE FOLDERS

THE NATIONAL MACHINE TOOL CO.

1536 CLARK ST.,

RACINE, WISCONSIN

NEW ROCKE
HAND MILLER
FOR SMALL PARTS

\$98

[Without Fixtures]
F.O. B. Chicago
Motor Extra

One of the ROUSE Fixture Set-Ups the Speed Production

The Rouse Hand Miller is a versatile, efficient, high-speed ball bearing machine for handling light cuts in brass, aluminum and steel.

Rouse Fixture Set-Ups make the Rouse Hand Miller readily adaptable for accurately milling small parts for planes, radios, electric motors, and similar equipment. Spindle will take milling cutters or end mills.

Prompt delivery can be made. Send for circular.

H. B. ROUSE & COMPANY 2214 N. Wayne Ave., Chicago 14, Illinois



MASKING DIE HOLDER

A compact, self-contained unit which holds all marking dies in exact position ready for stamping is announced by Acromark.

The face of each marking die is protected in the holder so it may be placed in marking position quickly without danger of scratching work.

Each marking die is properly balanced with the marking arranged so that an impression can be made by a single hammer blow on each die.

Each die is supported in such a manner that "bounce or chatter marks" are practically eliminated.

Individual sections of the marking may be changed as required, it not being necessary to scrap the entire set-up or die.

essary to scrap the entire set-up or die.

Markings cannot be placed in wrong
position or inverted after holder is set
in place.

Acromark will be glad to send you details concerning your particular applications. Address—Engineering Dept., The Acromark Co., 915 Morrell St., Elizabeth, N. J.



The only 3-way reading precision indicator. Accurate in either direction. Feeler mounted in centered cone bearings. .014 reading. Priority rating required.

Price \$5.00 plus postage. Write for folder.

J. R. Reich Manufacturing Co.
45 E. Stroop Rd., Dayton 9, Ohio



turning operations that a lathe can now perform the work 4 to 10 times faster than was formerly possible.

Instead of requiring several set-ups and the taking of numerous measurements, the Turchan Attachment performs all of the operations with but one set-up, and provides automatic sizing of all tapers and radii. Because of the man-hours it saves, the attachment pays for itself in only a few weeks' time.

The principle on which the Turchan operates, that of reproducing irregular or eccentric shaped parts by following a model or template, makes the Turchan also applicable to work on milling machines, planers, grinders, shapers and boring mills.

If you have a profile job on which you would like to step up the production rate, send us a sample or blueprint for a free production estimate based on the Turchan's performance in hundreds of plants throughout the nation.



Precision.

TAPPING

Leads seconds



M & L

PRECISION TAPPER

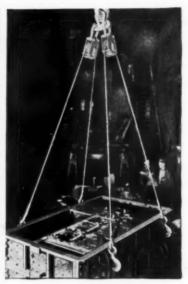
This is a fast rugged production tool capable of sustained accuracy. Flexible and adaptable, it cuts clean screw threads, handling up to ¾" in non-ferrous metal and 0 to ½" in SAE steel. Class 3 and Class 4 gage fits and high production schedule are accomplished in normal operation even with unskilled help.

Tapping speeds are 95 to 350 rpm with reverse speed twice that of forward speed. Taps are guided by precision ground lead screws which are easily and quickly changed. Bulletin 143 gives full details.

Dealers' inquiries are invited

LECKING

MACHINE AND EXPERIMENTAL CO. 716 N. Highland Ave., Los Angeles, Calif.



"LEVEL-LIFT" SLINGS

The complete line of MacWhyte Caldwell "Level-Lift" Slings, (all patented) are now made in ¾, 1½, 3 and 6-ton capacities.

Operation is simple, After the lightweight block containing wire rope is put on the crane hook, crane operator spots crane hook over the approximate center of gravity of the load and floormen attach sling to the load.

The crane operator then applies the power to lift the load, and as the crane hook is lifted, the rope automatically adjusts itself thru the "Level-Lift" block.

THE SIMPLIFIED



Unique construction enables operators to rapidly determine temperature even on minute spots, fast moving objects or the smallest streams; no correction charts, no accessories, no upkeep.

THE PYROMETER INSTRUMENT CO. 102-105 Lafayette St.,





Your cost per tapped hole is much less when HY-PRO Ground Thread Taps are used. When tapping at high speeds these high production taps will usually produce at least SIX TIMES AS MANY HOLES AS A CUT THREAD TAP! In addition, they require only about one fifth the sharpening for the same number of holes, and are less easily broken.

PROMPT DELIVERY. 10 days to 2 weeks delivery of most sizes not in stock.

Commercial • Precision • Special Ground Thread Taps

Send for Catalog on Company Letterhead

HY-PRO TOOL CO.

New Bedford, Mass., U.S.A.







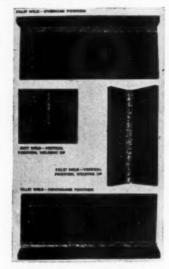
Makers of hand and power hack saw blades, frames and metal sutting band saw blades.

7392

For complete information, MacWhyte Co., 2966—14th Ave., Kenosha, Wis., will send a copy of Folder No. 44-71 showing complete specifications and pictures of the sling in use.

ALL-POSITION ELECTRODE

A new shielded are electrode for general purpose welding of mild steel, claimed to offer outstanding advantages over existing electrodes of the same classification is announced by The Lincoln Electric Co., Cleveland, Ohio.



Designated as "Fleetweld 47", it has extremely low spatter loss, easy slag removal (most welds are practically self-

* CENTERLESS GRINDING

Straight Cylindrical, Shoulder, Profile, and Multiple Diameters . . . Long Bar Grinding . . Ground Taper Pins and Dowel Pins.

Screw machine products. Heat treated and ground if necessary. Improved and expanded facilities assure prompt and accurate service. Send your blue prints or samples for

estimates.

RTFR MACHINE COMPANY

PORTER MACHINE COMPANY 3100 Enyart Ave., Oakley, Cincinnati, O.



MOTOR TOOL MANUFACTURING CO.

THE CORTIAND AVENUE - DETROITS MILE

Make it a Rule to Call Motor Tool

INDUSTRIAL DIAMOND TOOLS FOR EVERY USE



Our No. 703 - three layers of seven diamonds each. Multiplicity of cutting points; depending on diameter of wheel, four or more diamonds will always contact the wheel, giving finer dressing and precision finish. Recommended in all straight-faced dressing and truing on wide-faced, hard silicon carbide wheels. Used most effectively on Cincinnati Centerless, Norton Cylindrical, Landis Cylindrical, and Cincinnati Cylindrical Grinders.

Requires fewer passes across the wheel.

Generally used with fast dressing traverse.

"Experts agree they are the best on the market."



cleaning), excellent re-striking character-

istics, and other improved features.
"Fleetweld 47" conforms to American
Welding Society electrode specifications
Class E-6012 and E-6013 and may be used with either a-c or d-c. It is especially well suited for making high speed horizontal or flat fillet welds over 4" long in which the coating can be dragged on both plates. It has also been used extensively for vertical and overhead fil-lets, especially where large single pass fillets are desired.

The ease of complete slag removal on square edge butt welds is said to make "Fleetweld 47" excellent for this type of joint. Complete penetration of 1/4" plate can be obtained by welding one pass from each side.

The new electrode is available in 5/32x14; 3/16x14; 1/4x18 and 5/16x18", packed in 50 pound containers.

The accompanying photo shows some weld specimens.

FANWELD HARD-FACING METAL

A new non-ferrous hard-facing metal is offered by Fansteel Metallurgical Corp., North Chicago, Ill., under the name Fanweld. The metal is intended for acetylene torch application to steel, and possesses marked resistance to abrasion, heat, impact and erosion.

Unlike usual hard-facing alloys of the tungsten-cobalt-chromium group, Fanweld contains tantalum-columbium carbide which imparts a peculiar self-lubricating action, minimizing destructive effects of friction even at elevated temperatures. It is said that extensive tests in the Fansteel plant indicate Fanweld is well suited for hot work punches, dies and

Properly applied, Fanweld "wets" steel surfaces readily without use of flux, flowing smoothly and evenly. Surfaces as thin as .010" can be applied with a fusion layer as thin as .0005". No hardening or heat treating operations are necessary.



IITS, Dayton 4, Ohio

"INSIDE DOPE" ON THIS EFFICIENT TAP HOLDER



Here's the inside story of why Procunier Tapping Heads assure greeter accuracy at high speeds—with less tap breakage. The tap is driven by a double-cone, cork-faced, friction clutch which engages the conical surfaces of the drive and reverse shells with a velvet-smooth "cushioned" action. The tap driving power is automatically regulated by pressure applied to the friction clutch through the drill press spindle. Operators can quickly detect dull or loaded taps by the "feel" or pressure on the clutch required to drive them, and needless tap breakage is avoided. Bottom tapping is readily accomplished, since the clutch instantly slips; should the tap strike bottom or stick due to tap loading. Strain and wear are minimized and torsion is eliminated through the three-point balanced heat treated gear reversing mechanism, which distributes the pull through three intermediate gears. Reverse speed is twice the forward speed. The chuck spindle is sup-

ported at both ends which assures true operation of the spindle and avoids any possible wobble in the tap. The tap idles in the tapping direction not in the "backing out" direction. Results: longer tap life and in-

creased accuracy.

The Most Practical Tap Holder Ever Made

A broached section in the chuck receives the flattened surfaces on the spring collet, while the tap has a positive drive through the square hole broached in the collet. The tap is held in true alignment by the round of its shank, and tap shanks are never scored or disfigured.

SEND FOR BULLETIN

giving full details, description and prices on complete line of Procunier Precision Tapping Heads to meet all needs. The new Tru-Grip Tap Holder and also the full line of Procunier Universal Tapping Machines.

PROCUNIER

For Faster More Accurate Tapping

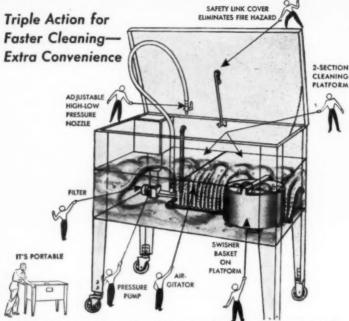
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14	S.	Clin	ton	St.,	Chicag	10,	m

Send me bulletins on () High Speed Tapping Heads, () Tru-Grip Tap Holders, () Universal Tapping Machines.

N		

Address..... City..... State

LOOK AT THESE FEATURES! OF THE Gray-Mills Agitor PARTS CLEANING SYSTEM



Here is the parts washer for you. It's portable, easy to use, efficient, and it provides 3 ways for removing grease, grime and oil. 1. Soak cleaning with Air-gitator action. Bottom rack accessory makes possible use of entire tank for cleaning large pieces. 2. Swisher cleaning of small parts in bulk. 3. Pressure pump cleaning of larger parts and hard-to-clean cavities. Check the features in the picture above. Send for literature on this better, cleaning system.

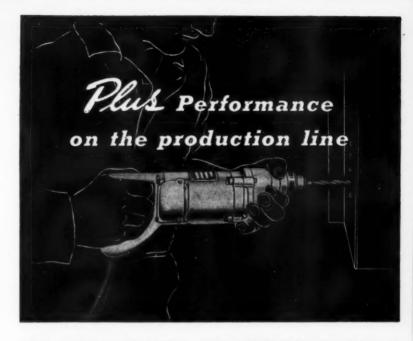
GRAY-MILLS CO.

1945 RIDGE AVENUE

EVANSTON, ILLINOIS



Acitene Cleaning Salvents



CP UNIVERSAL ELECTRIC DRILLS

Designed to stand up under continuous, grueling service, CP Universal Electric Drills are noted for their powerful, high-torque, smooth-operating motors. They are unusually cool-running, too, due to CP "Straight-Line Airflow" ventilation! Silent operation and longer life are assured through

heat-treated helical gears and ball bearings throughout.

Chicago Pneumatic manufactures a complete line of Universal Electric Tools-Drills, Reamers, Tappers, Screw Drivers, Nut Runners, Grinders, Sanders, Buffers, Flue Rollers, Hammer Drills, Scalers, Files. Send for Catalog No. 899.





VACUUM PUMPS DIESEL ENGINES VIATION ACCESSORIES

ELGIN PROVIDES OPERATOR COMFORT

The Elgin line of precision lathes is now provided with bases which afford ample leg room and foot rests. The operator can sit close up, directly in front of his work and there is plenty of leg room for maximum comfort.

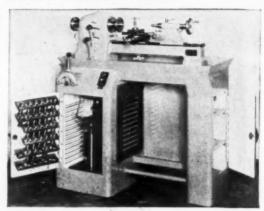
Motors are mounted in the base and direct cross ventilation is provided.

There are three shelves on the right hand side of the cabinet, and a handy collet board is mounted on the left hand door just below the convenient centralized controls.

The variable speed drive has been expanded upward and downward so that stepless spindle

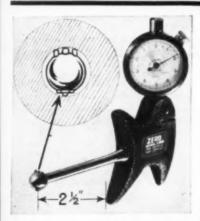
speeds are available ranging from 40 to 4,000 rpm.

Full details on this and other advanced features are available from Elgin Tool Works, 1772 Berteau Avenue, Chicago 13,



INDUCTION HEATING

A new 28-page bulletin (No. 25) that covers many jobs being done by highfrequency heat, entitled "Induction Heating and Melting in Industry" is offered



All inquiries answered promptly Write for information to . . .

The Zero Internal Gauge

Model H2 was designed for accurate checking of holes from .500 to 1.000" in diameter. Standard length of this gauge is $2\frac{1}{2}$ " but other lengths are available on order.

Two contact points and two equalizers are provided on the gauging head to assure accurate readings on the .0001" indicator. With each diameter extension the gauge has a 1/16" range and can be set up with measuring blocks or micrometer. Head is not separable from barrel. Construction is sturdy and simple, and the gauge is designed for heavy duty production use. Readings are not affected by temperature.

Our gauges in use at Pontiac, Cadillac, Packard, Westinghouse, Allison and various other companies.

ZERO INTERNAL GAUGE CO. 15025 Chevenne Ave., Detroit 27, Mich.



One Operation on a CLEVELAND AUTOMATIC

Here's another example of modern production thinking plus the advantages of Cleveland Automatic versatility and speed. Some idea of the sturdy cuts made on this 6-13/32" automotive gear blank is given by the type of chipping shown in the illustration at right. Steps are.. Gauge 6-1/2" bar stock from station 1... Trepan on 2... Drill from station 3 while turning OD from center turning stem... Form hub and face blank from station 5...Cut off from front cross slide.

Net production rate information is restricted, but it represents a saving over previous time, which involved two operations in addition to cutting stock. This is a standard Cleveland Model A 8" Automatic.

Remember . . . Clevelands Cut Costs

THE CLEVELAND AUTOMATIC MACHINE CO.

2277 Ashland Road • CLEVELAND 3, OHIO
BRANCHES: Chicago • Detroit • Newark • Cincinnati • Hartford



For turning parts as small as .075" (with rollers) or .020" (with car-

bide blocks). A finely made Screw

Machine Tool, rigidly built for

maximum accuracy. Designed for quick and easy set-up.

by the Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J.

Starting off with a brief history of induction heating and a description of just what it is, the bulletin contains many pages of interesting applications showing how high-frequency heat can be put to work in plants to save time, produce more accurate results, reduce spoilage and to do unusual heating jobs, many of which couldn't be done before.

Copies are available upon request.

THOMAS DISINTEGRATORS

The Thomas Tap Extractor and Metal Disintegrator machines were developed late in '43 to speed production of critical machined parts, by taking them out of salvage and putting them back into production. It was never contemplated the machines would do more than remove broken, embedded taps and other small tools from otherwise scrap parts. But many other equally-valuable uses are being found for them.



The equipment consists, basically, of a coolant system, graduated step-down transformer, working head-holding modified solenoid coil—and actuating a plunger carrying a hollow, non-ferrous electrode.

To remove a broken small tool (tap), an electrode of proper diameter is screwed into the plunger of the working head,

Product Performance



with HAN-DEE Springs, Wire Forms and Screw Machine Products

A spring for every purpose, no matter how small, can be engineered for your product by HAN-DEE, in the quantity you desire. Individual attention will be given to your unusual problems by our competent engineering staff.

Facilities for machining castings and small assemblies.

For prompt efficient service . . . for quality springs at low cost, consult HAN-DEE. A sample or blueprint will bring a prompt quotation.

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Chief Engineer



J. W. FAY

of

Republic Precision Mfg. Co.

2317 W. Grand Ave., Chicago 12, III.

Reports -

his company has performed over a

MILLION

lathe operations, with the New

"RAY" AUTOMATIC FEED CONTROL

Operating the half-nuts, mechanically.

This may not be unusual, but should suggest satisfactory efficiency.

If you are not yet using these controls, possibly your production costs are high.

Models for LOGAN and ATLAS lathes from stock. Priced at only \$22.50.

From your dealer or

INDEPENDENT SPECIALTIES 152 W. 75th St., Chicago 21, III. and the broken embedded tap centered under the electrode. Workpiece is held to table with a "C" clamp, or other holding device, and electrode is fed down to make contact with broken tap. Coolant and a low-voltage, high amperage current flow thru the electrically-vibrated electrode, creating a high temperature make-and-break arc at point of contact. Rapid, controlled disintegration of contacted metal progresses thru core and bottom of tap, after which cutting edges, which were left in place to protect thread and side walls of hole, can be lifted out easily with magnetized scriber, leaving hole, thread and workpiece good as new. Because of approximate %" travel of plunger, feed is semi-automatic.

Coolant flushes the disintegrated metal from core of tap in particles so fine they actually float on surface of coolant. Taps from No. 2's on up are well within the range of Thomas machines and are easily removed regardless of material in which they are embedded. Holes, slots, etc., of various shapes and diameters can be made by simple change of electrode.

Because the electrode vibrates but does not rotate, machine performs many unusual functions, including:

usual functions, including:

1—Cutting keyways in hardened shafts and gears.

and gears.

2—Cutting dogging squares in brake discs.

3—Scarifying and drilling hardened dies.

4—Extending oil lines in machined and hardened crankshafts.

Machines are built in three popular models: The "Hand Portable DeLuxe" and "Master Portable" models have self-contained coolant systems, but require drill or arbor presses to hold and feed working head. "Super" model is completely self-contained, carrying its own column, arm, and feed, permitting head to operate in any position or at any angle (on or off the machine). Requires only light socket to put into immediate operation.

Standard Thomas machines take ordinary 110 Volt, 60-Cycle, a-c current-bud all models can be obtained to work on 220, 440 volts, etc., in various cycles and phases—also for operation on d-c. A 15 amp. fuse will easily carry the load. Current consumption is said to be low, comparable to a 110 watt Mazda light.

Thomas machines are manufactured and sold by Clinton Machine Co., 8240 Harper, Detroit 13, Mich.

DIAMOND WHEELS

An 11-page supplementary price list with specifications on Larco resinoid bonded diamond impregnated wheels is offered by Larco Diamond Tools, 36 W. 47th St., New York City.

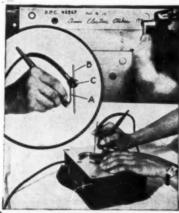


tirely all moisture from compressed air lines which have heretofore proved stubborn. Entirely mechanical and automatic. No obsorbents . . . no chemicals, Instell it and forget it.

Murphy knows compressed air. Write for our literature, or state your problem. Our engineers are at your service.

WRITE FOR BULLETIN No. 1 CONTAINING SPECIFICATIONS





ANNIS ELECTRIC ETCHERS

(for precision work)
with the stylus that stays cool

R. B. ANNIS CO.

"10 MILLION PIECES

without a single rejection, thanks to MICRO-CHEK"

- says LUCAS SCREW PRODUCTS, Inc.



Inc., of Rochester, N. Y., reports:

"We find them to be a low-cost economical way of controlling accuracy on high precision automatic screw machine production. In numerous cases, we have reduced our gage cost from 50 to 75 per cent. They check close tolerances... eliminating fatigue and uncertainty upon the operator. Their simplicity enables us to use inexperienced help in final inspection. In one case we produced 10,000,000 pieces without a single rejection from the prime contractor."

Speed inspections in YOUR plant with TRICO MICRO-CHEK Comparator Gages, now in use in more than 3600 war plants... on machines, on inspection lines. Send for booklet which illustrates many applications.



BAD NEWS FOR THE ENEMY—This deadly line-up of 5" dual-purpose Naval guns at the Louisville Naval Ordnance Plant, operated by Westinghouse Electric & Mfg. Co., means nothing but trouble for the Germans and Japs. Such guns, used on destroyers, cruisers and battleships, have made an outstanding record in hitting enemy ships and planes.



CONE-DRIVE GEARS

A 20-page booklet intended as a possible suggestion source for designers of new products in which right angle reduction gearing is to be used is available from Cone-Drive Div., Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12. Entitled

"Post-Graduate Course for Gears" (Bulletin No. 745), this new publication records some of the current war-time uses of Cone-Drive gearing in order to indicate the type of current and future service for which this gearing is especially adapted.

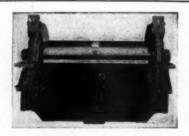
IF YOU WERE TO WRITE THE SPECIFICATIONS

Chances are, your ideas of a heavy duty stand snagger come pretty close to the Marschke Vari-Speed Grinder specifications.

Your overall expectation would be "maximum metal removal with minimum wheel wear" and to this end your first demand would be, gradual spindle speed variation, to get constant wheel rim speed for all stages of wheel wear.

Secondly you'd want a lot of power. You would call for a stiff spindle with accurately fitted flanges and large bearings to assure smooth wheel rotation along with the power.

Even these basic requirements wouldn't satisfy unless there were conveniently adjustable, rugged work rests, safe wheel quards, efficient exhaust and clean-outs.



Of course you would also specify size and mass of base to absorb the tremendous forces resulting from impact between castings and $24^{\prime\prime}$ or $30^{\prime\prime}$ wheels driven by a 25 to 40 HP motor.

You know that such a machine soon pays for itself — and we know that the MARSCHKE VARI-SPEED GRINDER is just such a machine. To get the details ask for Marschke Bulletin No. 51. Write

VONNEGUT MOULDER CORPORATION

1805 MADISON AVENUE

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. . PRECISION . .

After running 100,000 pieces on production, a MARVECO LIVE CENTER tackled an emergency tool job. It qualified because its run-out was only .0001. That's persistent precision, a MARVECO characteristic.

The MARVECO is GUAR-ANTEED to OUTPERFORM and OUTLAST any other LIVE CENTER.

Our illustrated catalog will be sent upon request. See for yourselves the MAR-VELS of MARVECO.

Send us your

MARVEL TOOL & MACHINE COMPANY 10977 W. JEFFERSON AVE., RIVER ROUGE 18, MICHIGAN





A new spring steel Speed Nut Latch (No. 1663) has been developed for instant attachment and removal of box covers, access doors, panels and inspection plates. Spring arms of the Speed Nut snap over ball or grooved studs to provide firm attachment, yet studs may be quickly withdrawn. The Speed Nut is available in five material thicknesses to provide the desired degree of pull-out tension. Three styles of ball studs are available . . . drilled and tapped for 6-32 screws, threaded shank (6-32 thread) and plain shank for riveting. These as well as the grooved stud, are provided in various lengths to suit application requirements. When writing for samples, please specify (a) pull-out tension required (3½, 8, 12, 18, or 30 lbs.); (b) thickness of panel to which Speed Nut will be attached, (c) type of stud, and (d) length of plain or threaded shank, or length of grooved stud. Manufactured by Tinnerman Products, Inc., 2107 Fulton Road, Cleveland 13, Ohio.

POWERSTEEL SOLID BITS

A new solid cast steel cutting tool is being introduced by Crobalt, Inc., 1342 N. Main St., Ann Arbor, Mick. The new cutting tool is produced by melting a special Cobalt steel alloy in an indirect arc rocking electric furnace, super heating to well above 3000° F and casting in molds of approximate tool size. This process is said to give the metal a preferred grain and carbide particle size at the time of casting, thus doing away with the need of forging and later heat treating.



E specialize in precision work and in getting it out ON TIME! End Mills, Reamers, Countersinks, Dovetail and Circular Form Tools, Shell End Mills, Gages of all Types, Centerless Grinding.

For Quick Quotations, Write—Wire or Phone BUCkingham 3417

Andersons, Inc.

2329 Nelson Street, Chicago 18, Illinois

Grinds straight and spiral flutes from solid

TAPS — REAMERS — MILLING CUTTERS

Automatically grinds straight and spiral flutes in tool stock such as taper pin reamers, small taps, teeth in milling cutters, capular cutters, sharpens saws in gangs up to $3\%^{\prime\prime}$ long with diameters ranging from $y_0^{\prime\prime\prime}$ to $9^{\prime\prime\prime}$.

It is especially effective in grinding and sharpening reamers in a wide range of sizes down to 1/16" diameter with spacings from 2 to as many flutes as tool requires.

Arrangements can be made for other special applications.

Write for Bulletin 50F.

Produces precision tools with unskilled labor

THE WARDWELL

Automatic Universal Flute Grinder



MANUFACTURING CO. 3165 Fulton Rd., Cleveland 9, Ohio

Have Your Plates Re-scraped

by a Nationally Known Surface Plate Manufacturer!



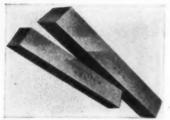
Equipped for precision finishing by a staff of Skilled Specialists

All Makes ... Moderate Prices ... Prompt Service ...

Write for Quotation and Literature

Lapping Plates Made to Order! Prompt Service!

SQUARE SURFACE PLATE & TOOL COMPANY
221 N. MAIN ST.
ROYAL OAK, MICH.



Charles Baird, Vice-President in charge of development and production for Cro-balt, says that the process results in a tool that will retain its cutting ability on many types of work several times longer than has heretofore been considered possible. Also that cutting speeds can be in-creased safely by 20%. Mr. Baird empha-sizes, however, that Powersteel tool bits are not recommended as a cure-all for every kind of cutting job. The specific types of work for which they are espe-cially adapted have been determined after an exhaustive series of tests made in cooperation with several large manufacturers.

Powersteel solid tool bits are supplied

hardened and ground, ready for use. They can be resharpened and used as long as the tool can be held in the holder. They require no change in present equipment or shop practice. They are available from stock in nine standard sizes of square bits and five sizes of rectangular bits.

Unlike other solid bits. Powersteel is priced by the piece. Approximate poundage, however, is given in price lists, for purposes of comparison. Descriptive bulletin, with prices, will be sent on request.

SUNDSTRAND TRANSMISSIONS
The Sundstrand Machine Tool Co. of Rockford, Ill. announces a new 4-page bulletin "Sundstrand Oil Power Transmission for Variable Speeds." It illustrates and describes the operating principles, features, possible applications and en-gineering data of their oil power transmissions.

The unit requires oil reservoir and electric motor, and the output speed range is between 10 to 2400 rpm with infinite variation within this range. A constant horsepower rating is developed thruout a speed range of 500 to 2400 rpm. A high mechan-ical efficiency is claimed thruout the entire speed range. Only a small volume of oil is required to operate the circuit.

"Hard-to-Clean"



Send for complete free catalog of Phillips Machinery, Vapor degreasers — dip tanks — washers. Phillips Engineered Service ofters a specialized machine for every cleaning problem. Lists of installations available on request,

NEW TWO-STAGE SURGE WASHER

This new Phillips metal washer has 2 compartments-for washing and rinsing. Each surge platform handles parts or basket loads of 50 lbs. each, giving maximum agitation, both vertical and tilting. Removes chips, grease and dirt not easily removed by simple dip or vapor degreasing. Either or both tanks heated or unheated. Hinged cover acts as drain board. Can be used with emulsion or alkaline cleaner.

We recommend SWIRT for use with this Phillips Two-Stage Surge Washer. SWIRT is the ideal emulsion cleaner non-toxic, odorless - high flash point. SWIRT in the cleaning tank-water in the rinse tank-makes an efficient, economical metal washing combination.

3455 TOUHY AVENUE PHILLIPS MFG. CO. CHICAGO 45. ILLINOIS





HE manufacture of Drill Jig Bushings and the manufacture of Gages are so closely related that Economy Tool has found it most practical to specialize in the production of both.

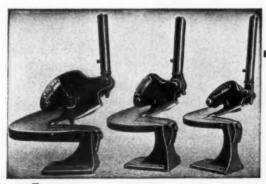
This kind of a set-up also enables us to manufacture various other hardened and ground precision parts, including Centerless Grinding and Super-finishing, in limited quantities.

Experience through the years tells us that your job can be no better than the tools applied in the making. Your production standards are high for a reason. Nothing will suffice unless it meets specifications exactly as you prescribe them.

Precision, therefore, has become a law to us. Tools are made to keep you at top production with minimum cost.

Write today for particulars

ECONOMY TOOL & MACHINE CO. MILWAUKEE 14, WIS.



Get BEVERLY Throatless SHEARS

SAVE TIME ON WAR ORDERS!

If you're cutting straights or irregulars on War orders you can speed 'em up with a BEVERLY Bench-Type Shear. Order No. 1 for 14 Ga., No. 2 for 10 Ga., No. 3 for 3/16 mild steel and 10 ga., stainless.

THE BEVERLY SHEAR MFG. CO., 3005 W. 110th Pl., Chicago 43, III.

SUPREME Super Duty Shear Blades

"All the name implies"

LAID CARBON

LAID HIGH SPEED Let us send folder giving full details. SOLID HIGH SPEED

WE MAINTAIN A REGRINDING SERVICE FOR SHEAR BLADE USERS

THE SAW & KNIFE SPECIALTY CO.

6523 CARNEGIE AVENUE

CLEVELAND 3, OHIO

AIR-LINE FILTER and AUTOMATIC LUBRICATOR



Removes \$5% to 97% of All Water, Dirt and-Scale from Airline

Air passes through a series of brass discs with .002 spacings, providing the finest degree of filtration obtainable

by any known method. Then, as the air passes through head of Lubricator, oil is delivered into the purified airline in any desired volume.

130-134 E. LARNED ST. DETROIT 26, MICHIGAN



Pictured: a 38-Spindle Heavy-Duty Drill Head.

DESIGNERS AND MANUFACTURERS OF MULTIPLE DRILLING EQUIPMENT

We invite your inquiry.

CHIGAN DRILL HEAD CO. HAZEL PARE, MICH

DOUBLE YOUR DRILL PRESS CAPACITY

Minutes are Seconds with the new TWISTITE Vises. Open to full capacity in one second. Speed Defense Production with these New Vises.



A. RICHARDS CO., Kalamazoo, Mich.

We also manufacture MULTIFORM

Bender-Cutters for producing brackets and fixtures from flat wire, etc.

MULTIFORM PRODUCTS-

Ask about our machines and service.







Headquarters for Standardized Die Sets, embodying many exclusive features and embracing more than 195,-000 stock sizes and 46 different styles. A die set that is unsurpassed. Let us prove it!

Send for our new 336 Page Catalog.

E. A. BAUMBACH MFG. CO. 1810 So. Kilbourne Ave., CHICAGO, ILL.

SAVES TIME

IN YOUR STOCK ROOM

The BROWN SECTIONAL RACK saves the time previously lost in end-hauling each bar of stock its entire length from the old-style, closed-side Rack, the Brown Rack requiring but a few inches of side movement. Each length, width and thickness of stock is displayed in gold-fish visibility for instant selection. Workmen waiting for stock are served without waste of time.



Any time you require additional storage space, all you need do is add more units. If you want to relocate it at any time, you can do so quickly for it is unattached to the building.

It is a simple, durable article made of metal in five styles. It can't burn, warp, sag or twist; depreciation is practically nil. SEND FOR BULLETIN No. 26-B DESCRIBING THE—

BROWN SECTIONAL RACK

BROWN ENGINEERING CO.

126 N. THIRD ST. READING, PA.

FELL PRECISION I FVFI



A precision "all-way" level for use in machine tool building, acting up and maintenance, whether for establishment of level working surfaces or for the accurate checking of straightness where true level itself is not required.

Graduations are in .0005* per foot and form equares about a circular bubble, thus giving coordinate readings and showing the direction and amount of elope, if any. Made in two sises—5½*x12*; 3½*x0*.

Write TODAY for bulletin giving full details.

Wm. B. FELL COMPANY 700 South St. Rockford, III.

LEIMAN BROS.

Rotary Vacuum Pumps

Ouiet in Operation Highly Efficient

THEY TAKE UP THEIR OWN WEAR



Used for feeding paper or cardboard in presses-bottle filling-etherizingdehydrating-impregnating.

Agitating—aerating—gas boosting air motors - for gas furnaces, testing instruments.

SMALL PUMPS WITH LARGE INTERIOR CAPACITY

TRY ONE ON YOUR NEXT AUTOMATIC MACHINE.

LEIMAN BROS. Inc., 173 CHRISTIE ST., NEWARK 5, N. J.

"World's Finest Precision Ground



DIX Universal Joints come in 15 standard sizes, from 3/6" to 4" Hub Diameter made to Army, Navy, Air Corps spec. AN-40236 ready to install, or can be made to customer's specifications. Eliminate "rejects" with DIX Universal Jointsl Write, wire for catalog, prices, specifications, etc.

TERRITORY DISTRIBUTORS **JOBBERS**

PRECISION-MADE and **AVIATION TYPE**

Wherever perfect-func-tioning joints are re-quired — Dix Precision-Made Universal Joints will give the utmost performance and satisfaction. Let Dix engineers help solve your problems.

MANUFACTURING COMPANY

3447 EAST PICO BLVD. LOS ANGELES 23, CALIF.

PRECISION MADE **PRODUCTS**

THE "FORM-MASTER"

ANGLE & RADIUS DRESSER

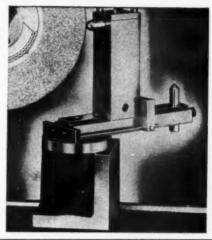
A sturdy, quality instrument designed by form-grinding specialists to dress both angles and radius at low cost. Two 1/3 ct. diamonds and instrument case included — \$150.00 complete.

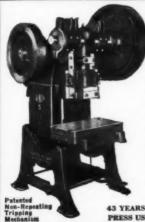
Geatures

Large range. Chatterless and dustproof. .0001" accuracy obtainable. Simple to operate. Reasonably priced.

Call your supplier or write

J. & S. TOOL CO. 477 Main St., E. Orange 2, N.J.





UNLIMITED PEAK PRODUCTION

Much larger die space than average presses. Engineered and designed for unlimited peak production.

Reinforced construction at points of greatest wear.

If you want the best, send for illustrated catalog describing complete line TODAY.

With Modern

JOHNSON

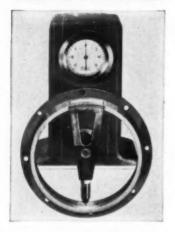
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PRESSES

43 YEARS ENGINEERING EXPERIENCE BUILT INTO EVERY JOHNSON PRESS USED BY LEADING MFR'S. THROUGHOUT THE WORLD,

JOHNSON MACHINE AND PRESS CORP.,

ELKHART.

GAGING INSIDE DIAMETERS



A unique and speedy method of gaging the inside diameter of a large bearing housing to very close tolerances is shown. A special sizing plug was developed, with the upper part of the plug finished to the exact radius of the inside of the bearing housing. The lower part carries the gaging head, which is calibrated for high and low limits of accuracy. The contact point is highly polished norbide.

The Hole Checker unit is air-operated and is set with high and low limit master ring gages. The tolerance is .0005".

The gage was designed and built by The American Gauge Co., 162 Bayard St., Dayton 1, O.

LABOR-UTILIZATION

Improvement in labor utilization is the subject matter of a 44-page pamphlet issued by the Bureau of Labor Statistics of the U. S. Department of Labor. The pamphlet, among other topics, treats the matter of absenteeism among workers, labor turnover, training and upgrading, shift schedules, supervision and wage structures. Working conditions and safety are also considered.

Copies of the pamphlet—Improvement of Labor-Utilization Procedures, Bulletin No. 807—at 10 cents each, may be obtained from the Supt., of Documents, U. S. Government Printing Office, Washington 25, D. C.

H. S. COMBINED DRILL & COUNTERSINK



Size	Dicm. of Drill	Price per Doz.	Diam. of Body	Decimal Equiv. of Drill	Size	Diam. of Drill	Price per Doz.	Diam. of Body	Decimal Equiv. of Drill
A1 C2 D1	3/64 1/16 5/64	\$8.00 8.00 8.00	1/8 13/64 15/64	.0468 .0625 .078	J1 J2 M1	7/32 9/32 7/32	\$18.00 18.00 24.00	1/2 1/2 5/8	.2187 .2182 .2187
E1 E2 F1 F2	3/32 1/8 5/32 3/16	8.00 8.00 12.00 12.00	3/10 3/10 7/16 7/16	.0938 .125 .1563 .1875	M2 N1 N2	9/32 1/4 5/16	24.00 32.00 32.00	5/8 3/4 3/4	.2812 .250 .3125

LIST LESS 10%

We carry a complete line of Drills, Taps, Dies; also special Taps and Dies,
Milling Cutters, Lathe Tools, Mechanics' Precision Tools, etc.

Write for Our General Catalog

Priorities Must Accompany All Orders

CENTER TOOL CO. Machine Thep Equipment 153 CENTRE ST., N.Y. 13

USE

Fluid-Motion for Modern form-dressing

ONE SETTING HANDLE CONTINUOUS MOTION

The J & S Model "E" Radii and Angle Dresser in the new "Fluid-motion" series is one of the finest precision dressing instruments procurable — regardless of cost.

FEATURES

Fluid-motion dressing .0001" accuracy Automatic centering 14" wheel capacity Large range yet compact Chatterless and dustproof

J. & S. TOOL CO.

477 MAIN ST. E. ORANGE 2. N. J.





New GLASS PRECISION ...



The "Main" all-glass surface plate is guaranteed flat within .0001". Tools slide over its highly polished surface without chatter or sticking. Wear is negligible because of the glass hard surface. Impossible to dent and even if scratched no burr is raised. Plate is non-magnetic, temperature resistant, corresion proof and non-warping. It measures 16" in diameter with ground and chamfered edges, mounted in a metal standard and supplied with a protective fett cover. PRICE ONLY \$28.50 LIST. Territory for dealers.

Write for details

MAIN ELECTRIC COMPANY, INC., Rochester 2, N. Y.

TUNGSTEN CARBIDE REAMERS



Solid tungsten carbide reamers in sizes as small as .125" are now available from

stock, according to an announcement from the Super Tool Co., 21650 Hoover Rd., Detroit. In addition, because of new manufacturing techniques they are able to produce these reamers in sizes as small as . Sizes below .125", however, will continue to be produced only on special order, but suitable blanks are now more readily available and deliveries are said to be good.

PRODUCTIMETER COUNTERS

Durant Mfg. Co., 1928 N. Buffum St., Milwaukee 1, Wis., announces a new design of Productimeter Bottle and Can Counter, the "HF" series, superseding the former "F" models.

The most notable improvement is use of the popular "H" type counter with its many distinctive features; modern, oilless bearings; engineered accuracy; curved, louvered window for quick reading of figures; strong, molded plastic number wheels; legible black figures on contrasting white background; heavy die-cast base with dust-tight metal cover; rust-

mounting plate; pleasing grey baked enamel finish, etc. The new "HF" series is available in either 5 or 6 figures capacity, counting to 99,999 or 999,999, and equipped with a 6 pt star wheel for counting bottles, and

proof construction; strong steel stamping





No. 11A Press

SPRING PRESSES

No. 11A FLOOR TYPE No. 00-0 BENCH TYPE

For riveting, staking, bending and stamping operations on light work. They are designed to compensate for variation in thickness of work, thus striking a UNIFORM BLOW at all times, an advantage found only in this type of machine.

OTHER MACHINES

Vertical Milling Machines
Duplex Spline Milling Machines

Drilling Machines: Medium Duty and High Speed Sensitive

THE TAYLOR & FENN COMPANY

HARTFORD, CONN.



ONLY \$4200 Complete QUICK SHIPMENTS ON AA-5 PRIORITY OR HIGHER

NEW SAW-GUN

SAWS and FILES where no other tool can reach!

* Now, many hard-to-get-at sawing and filing jobs that formerly required hours of time and the use of several tools, can be quickly handled with one tool—the SAW-GUN. Propelled by electricity, compressed air or flexible shaft, this new tool will rapidly saw or file light and heavy gauge metals of every description, corrugated or plain. It's ideal for panel notching in metal, wood, plastics and other materials. In fact, the Saw-Gun may be used advantageously in a wide variety of applications.

Sold on money-back guarantee.

See Your Jobber or Write Direct for Quick Delivery!

MID-STATES EQUIPMENT CO.

2435 So. Michigan Ave. (SAW-GUN DIVISION) Chicago, III.

ARTUS ARBOR SPACERS The COLOR tells



the THICKNESS

ARTUS Arbor Spacers made of plastic in various colors identify thickness at a glance! .001, .0015, .002, .003, .005, .0075, .010-.030. Speed up accurate fitting at low cost. Write for folder.

CONVENIENT TRIAL OFFER Handy Spacer Assortment

10 eq. .001 — .0125 thick 5 eq. .015 - .030 thick

100 SPACERS IN ALL

7/8" — \$2.80 11/4" — \$3.40 - 3.00

Other standard sizes also available.

Illustrated Folder Free. Immediate Delivery on Spacers, Gaskets, Shims

INDUSTRIAL PRODUCTS SUPPLIERS

106 Water Street, New York 5, New York

"TRIL-V" BLOCKS



Why Not Save Time-by having enough V-Blocks available at all times in your shop to avoid the delays involved in make-shift set-ups and tie-ups?

"TRU-V" Cast-Iron Blocks are available in nine sizes—from 3½ to 10°, in three styles. Each block is carefully machined on all sides, with close limits held within .001 where required. A machined ledge on both sides provides for clamping on machine bed.

> Let us send descriptive bulletin. Or contact your mill supply dealer.

Oliver Motorcraft Corp. 2532 S. Wabash Ave., Chicago, III.

DAYS DELIVERY



FOR FIRST SHIPMENT ON ACCEPTED ORDERS

THREAD MILLING CUTTERS (HOBS) EXPANSION- AND RADIAL RELIEVED FORM CUTTERS. Regular or interrupted tooth form

INVOLUTE SPUR GEAR CUTTERS-141/20: 200: & 250 P.A. Send Blueprints and Specifications

U. S. MACHINE TOOL MFG. CORP. PHONE 85 CLINTON, INDIANA

SAFETY Wedge Grip LETTERS and FIGURES

(Reg. Trade Mark)



Pat. No. 2,009,794

Deeper impression with less exertion

· Will not spall, will not mushroom

• 25% to 50% more service

Any size character from 1/16" to 1"

HELP PREVENT AN ACCIDENT TODAY!



228 E. Carson St., Pittsburgh 19, Pa



Dairing

COUNTERBORE SETS

Today's production program demands accurate, efficient cutting tools within easy reach. Gairing standard kits provide the answer for counterboring and spotfacing operations. Seven sets from which to choose. Each contains a logical assortment of interchangeable counterbores, pilots and holders boxed in sturdy cases.

THE GAIRING TOOL COMPANY, Detroit, Michigan

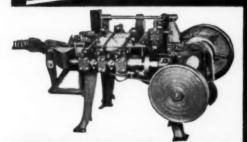
The set illustrated here consists of one Type A-1 holder, 9 cutters ranging from ¼" to ½", 8 pilots from 5/32" to ¾", 2 countersinks ½" dia., 70° and 82°.

Write for Bulletin C and prices.



TO MEET TODAY'S INDUSTRIAL REQUIREMENTS

THE NILSON AUTOMATIC METAL AND WIRE FORMING MACHINE



The Nilson Automatic Metal and Wire Forming Machine meets today's industrial requirements. Here are some of the features of this machine: Open construction of press and forming tools. Patented slide feed with an independent cam-operated wire gripping device. Power operating wire feed is transmitted through a straight line.

Write today for information

The A. H. NILSON Machine Co.



WAR or POST-WAR

Production Capacity

We are now in position to take on some additional work. Our plant is ultra-modern with finest equipment. Our staff has had more than 34 years of experience in management. engineering, designing and production - skilled in handling war contracts for large firms-quickly and efficiently.

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Use Our Complete and Modern DESIGNING, ENGINEERING, DRAFTING and INSPECTION Service and Equipment

DEFIANCE METAL PRODUCTS COMPANY

Contract Die and Tool Work **Commercial Stampings** Zachrich Bldg., Defiance, Ohio Telephone 170



The lowest. priced wire and rod cutter on the market. The hardened cutters last indefinitely.

Hand operated. A giant for work, cuts wire and rods up to %-in. round or %-in. square and band iron up to % in. by 2-in. Adjustable stop for repeated cuts to same length. Large or small, your shop can use a WONDER CUTTER.

> Write today for prices and trial offer.

The Federal Foundry & Supply Co. 4602 East 71st St. Cleveland, Ohio



No obligation.

for metal bonded or Resinoid

bonded diamond wheels.

Will Not Mar Metal or Plated Finishes

The New
PYRALIN
TIPPED
MALLETS

The SOUTHWEST MALLETS—a necessity in every tool chest.

SEND \$1.00 FOR POSTPAID SAM-PLE MALLET.

Place your orders now for immediate delivery.



The only Pyralin Mallet on the market with threaded tips replaceable by hand. Plastic tips are quickly and easily screwed into the solid "non-sparking, non-magnetic alloy heads" when replacements become necessary.

Send For Your Free Desk Calendar Today. Limited Quantity.

SOUTHWEST MFG. CO.

1615 EAST FIRST ST. - Dept. B-5 P. O. BOX 776 SANTA ANA, CALIF.



MILLING FIXTURE "KEYS"



Here is a simple yet rather revolutionary idea for both large mills and bench mills. The large Mill "Key" takes care of %, 11/16, and %" width slots in Milling Machine tables. The small Mill "Key" accommodates 9/16, ½, and %" width slots. Tolerances are closely held.

These "Keys" allow the operator to use any milling machine, regardless of the width of slot on its table. The "Keys" are made by Vlier Mfg. Co., 4552 Beverly Blvd., Los Angeles 4, Cal.

GEARGRIND UNIVERSAL JOINTS

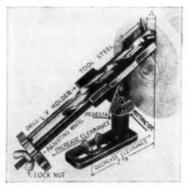


The two constant velocity universal joints illustrated have been designed by The Gear Grinding Machine Co., 3901. Christopher, Detroit 11, Mich. These high speed joints operate at speeds up to 9000 rpm between shafts subject to a maximum deviation from normal of 6. At all speeds and at all angles of deflection these joints are designed to deliver to the driven member the same constant speed of rotation that is provided by the driving member.

Geargrind engineers are in position to discuss the design of special constant velocity universal joints where proper ratios between speed and angularity are essential to satisfactory, trouble-free operation. A catalog covering constant velocity universal joints is available.

E-Z DRILL GRINDER

The E-Z Drill Grinder is a simple jig which can be set up quickly on a grinder frame or on a bench adjacent to the grinding wheel. It is simplified to the point where only a few standard motions are said to produce a factory finish on a dull drill in less than half a minute, even when done by an inexperienced girl.



This new drill grinder has a new protractor feature which enables it to be set quickly for three different drill point angles, depending upon the hardness of the material upon which the drill is to be used.

It sharpens all round shank drills from the shortest to 11" long—3/32" to 1/16" diameter. The manufacturer guarantees it to do the work and seeks agents and distributors. Address, Fred F. Ten Eyck, 758 South Irolo St., Los Angeles 5, Calif.

MULTI-FORM WHEELS

A 24-page bulletin (No. M-100-145) recently issued by the Sheffield Corp., Dayton I, Ohio contains considerable information on the grinding of threads and forms with Multi-Form Wheels. Numerous illustrations are contained showing the different operations, and specifications are also given. Copies of this bulletin are available on request.



This year we've got to make 2=3! We've got to lend Uncle Sam in 2 chunks almost as much as we lent last year in 3. Which means that, in the approaching 7th War Loan, each of us is expected to buy a BIGGER share of extra bonds.

The 27 million smart Americans on the Payroll Savings Plan are getting a headstart! Starting right now they are boosting their allotments for April, May and June—so that they can buy more bonds, spread buying over more pay checks.

Our Marines went over-the-top at Iwo Jima in the greatest, and hardest, battle in the Corps' history. Now it's your turn! Your quota in the 7th is needed to help finish this war, sidetrack inflation and build for future prosperity. So, captains of industry, plant your flag on top—like the Marines at Iwo Jima!

CAPTAINS OF INDUSTRY—here's your CHECK LIST for a successful plant drive:

- ★ Get your copy of the "7th War Loan Company Quotas" from your local War Finance Chairman. Study it!
- ★ Determine your quota in E Bonds the backbone of every War Loan.
- * Arrange for plant wide showings of "Mr. and Mrs. America"—the new Treasury film.
- * Distribute "How to Get There"-a
- new War Finance Division booklet explaining the benefits of War Bonds.
- ★ Circulate envelopes for safekeeping of bonds.
- ★ Display 7th War Loan posters at strategic points.
- ★ And -- see that a bench-to-bench, office-to-office 7th War Loan canvass is made.

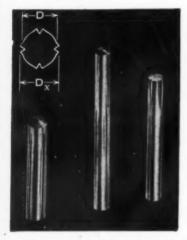
The Treasury Department acknowledges with appreciation the publication of this message

HITCHCOCK PUBLISHING COMPANY

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury
Department and War Advertising Council

"DRIV LOK" PINS

Driv-Lok Pin Co., 565 W. Washington Blvd., Chicago, announces a complete line of standard and special self-anchoring, vibration-proof pins, designed to replace more expensive taper pins, keys, cotter pins, set-screws, rivets, etc. These pins, which are pressed or driven into standard drilled holes, have four flutes on the surface parallel to the axis. Length and position of the flutes can be controlled accurately, so that fully or partially grooved pins are available. Fully grooved pins have pilots at one end so the pins can be easily inserted.



The raised, work-hardened edges of these flutes provide an expanded diameter of a few (specified) thousandths greater than nominal diameter of pin. When pin is inserted in a drilled hole, these raised edges are compressed inwardly, providing a resilient, self-locking element which, it is claimed, will hold indefinitely under vibration or shock conditions. They are available in sizes from 3/6" to ½" diameter, and from 3/16" to 4½" in length, in any material, and in a wide variety of types.

MASTER COPY TYPE

Master Copy Type, the name given to templates or patterns manufactured by the George Gorton Machine Co., 1409 Racine St., Racine, Wis., is described in complete detail in a new 24-page book-



let, designated as Catalog 1309-B. Samples and tables, showing all styles and forms of Master Copy Type, are included in the new Gorton book, along with illustrations and descriptive information on Master Copy Dials for Indexed Engraving and Special Templates for Profiling. Gorton Master Copy can be reproduced from full size down to 1/100th, and infinitely smaller, depending on the type of Pantograph machine used, by using variable settings on the machine. Instructions on how to order Gorton Master Copy Type by style, form and size help make the Gorton book easily understood and greatly simplifies ordering. Free copies are available now upon request from the manufacturer.

MOLTEN METAL PUMPS

The Ruthman Machinery Co., 1817 Reading Rd., Cincinnati 2, O., now has available on request, a new 4-page bulletin descriptive of the various molten metal pumps recently developed by this Company. Photographs and descriptions of each model are shown. One full page is utilized in describing various sections of the new Ruthman Catalog of Gusher Coolant Pumps.

EUTECTIC WELDING ALLOYS

A new and attractive 4-page folder has been issued by Eutectic Welding Alloys Co., 40 Worth St., New York 13, N. Y., describing in detail, Eutectic low temperature welding alloys.

Among the outstanding features claimed for the rods are: unusually low bonding temperatures that prevent distortion; less preheating of parent metal required; less after-machining and cleaning; increasing strength, with fewer rejects; and, all-around economy.

Copies may be obtained upon request.

OILY FLOOR TROUBLES STOPPED with FULLERS EARTH!

An oil and grease absorbent that replaces sawdust or wood shavings. Lessens fire hazard! Stops accidents due to slipping on oil or grease! Low priced - economical - safe! Write for FREE SAMPLE or ask for trial order at quantity price!

TAMMS SILICA CO., 228 N. La Salle St., Chicago 1, III.



Writes on hardened steel - demagnetizes at the same time-with carbon point does light spot annealing and soldering jobs. Compacteasy to use-dependable.

Send for details-5-day FREE TRIAL OFFER!

Luma Electric Equipment Co. Dept. H P. O. Box 132. Toledo 1. Ohio

LOWN SLIP ROLL FORMING MACHINES



A sturdy, heavy-duty former with rolls of tough steel, turned and polished. Supplied complete with motor and drum type re-versing switch. Sizes range from 38" to 98" roll length. All three rolls may be power driven if desired. Heavier and lighter machines also available. Write for details.

SAN ANGELO FOUNDRY & MACHINERY COMPANY

SAN ANGELO, TEXAS, U.S.A.

"Dealers in Principal Industrial Cities"



MONDS for Production

RE-SET-ABLE . BIG-HED-NIB

(Trade Marks Registered)

LOC-KEY-SET by Patented Process U. S. Pat. 2,351,748 16

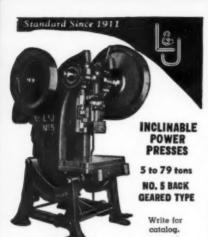
Fectory Branches Jebbers Everywhere

.RE-SET-ABLE adds to life of your diam ... More work per carat. Exclusive patented setting is tender to the diamond ... Holds firmly ... Protects from damage ... Quards against breakage.

No. 24 CN RE-SET-ABLES are now selling in 100 lots. Ask for easy No. 4 Catalog and Geinder's Instruction Card. Shows sizes to fit your machines. Tools backed by service

ads are LOC . KEY-SET for All diamonds are LOC - KEY-SST for immediate shipment ... Tools numbered in units of \(\frac{1}{2} \) carat(\(\frac{1}{2} \) \). Is is all old lettered to denote quality of diamond and style of mounting ... 3 grades — Common (C), Medium (MA), Belect (S), (4)-hour reserving service \$1.00 postpoid.) Bigger stones in C grade are gestuine economy in diamond one. For large wheels we recommend [Mn. 65-CM].

DIAMOND TOOL COMPANY, Not Inc. 928 L 41th Street CHICAGO 15: 11







SOLID COPPER DIAMOND TOOLS

Solid Copper diamond tools! That is the new development announced recently by The Cleveland Industrial Tool Corp., 4713 Euclid Ave., Cleveland, Ohio.

It has long been an accepted fact that heat generated in dressing operations tends to reduce a diamond's efficiency, loosen a stone in the setting, and often causes a stone to crack. Adequate cooling fails to lick this problem completely.

The high heat-conducting quality of solid copper, explains the reason for de-velopment of the new Solid Copper Dia-mond Dressing Tools. These tools feature diamonds set in solid copper shanks as well as solid copper matrices.

According to the makers, repeated tests by unprejudiced users have shown that these tools not only throw off the effects of great heat rapidly, but also clamp the diamonds more firmly in the settings. Tests thus far have shown the life of an average diamond to be much longer than that of a stone of comparable value set in the usual type steel or sintered shank.

Interested parties are urged to write for further particulars, which will be supplied immediately upon receipt of request.

SPEED UP

your tedious hand filing of dies with this



POSTEL DIE FILING MACHINE

Complete (without meter) \$38.00

POSTEL MANUFACTURING CO. 244 - 17th Ave. No.

Minneapolis 11.

Minnesota

TRY IT! For Super Performance



Petented

ABER CURVED TOOTH

OVERLAPPING SIDE MILLING CUTTER

The

Maintain that width with the "Chatterless Flowing Action" of Aber Curved Tooth Milling Cutters. Sizes up to 12" dia.

Write for Literature

ABER ENGINEERING WORKS, INC., Waterford, Wisconsin

MILLING - DRILLING - BORING ATTACHMENT OF Operations

Phote shows a special operation not suited to standard straidle mill set up but easily handled by means of a RUSNOK Milling attachment used horizontally on a standard milling machine, saving one machining operation and accomplishing greater accuracy in finished piece parts. Usas many types of cutters on a wide range of work. Easily mounted—tits to any angle. Large size spindle (No. 9 B & Staper). Takes \(\frac{1}{2} \) " def mills. Large quill with \(\frac{1}{2} \) to \(\frac{1}{2} \) " def mills. Large aligned (No. 9 B & Staper). Takes \(\frac{1}{2} \)" def mills. Large quill with \(\frac{1}{2} \)" to \(\frac{1}{2} \)" def mills. Large aligned \(\frac{1}{2} \) \(\frac{1}{2} \)" def mills. Large aligned \(\frac{1}{2} \) \(\frac{1}{2} \)" def mills. Large worm feeds, \(\frac{1}{2} \), \(\frac{1}{2} \), \(\frac{1}{2} \) no solo RPM. Lever and worm feeds, \(\frac{1}{2} \), \(\frac{1}{2} \), \(\frac{1}{2} \), \(\frac{1}{2} \) to 300 RPM. Lever and worm feeds, \(\frac{1}{2} \), \(\frac{1}{2}

Prompt delivery.
Write for illustrated circular and prices.



RUSNOK TOOL WORKS
4840 WEST NORTH AVE. CHICAGO 39, ILL.



POST-WAR PATENTS

High cost of patent law suits was decried as a serious handicap to the creation of postwar jobs recently by R. J. Dearborn, chairman of the Patents Committee of the Neticeal to be a suit of the patents.

of the National Ass'n. of Manufacturers.
"One method of lessening the evil,"
Mr. Dearborn said, "is to reduce the number of invalid patents issued, particularly on claims of invention which are too broad or which fail to distinguish new developments from what already is well known. This could be accomplished by following a recommendation repeatedly made by NAM to enlarge the staff of the

Patent Office and pay higher salaries."

The Patent Office, according to Mr. Dearborn, should have a liberal attitude toward the granting of patents, but it should use greater care in determining how much of the inventor's claim justifies patent protection.

"Due to pressure of work, Patent Office examiners do not have time to make a thoro search of the files to learn if an idea submitted is ne wor sufficiently different to justify the issuance of a patent," Mr. Dearborn said. "There is a tendency toward an incomplete investigation in the limited time available.

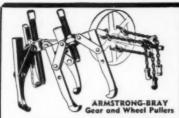
This leads to costly law suits to prove in the courts whether a patent should have been issued, and whether the inventor's claims were too broad. With a larger staff, the Patent Office could make more rigid exami-

nations and make sure that patents granted are limited to what is new."

Costly law suits, Mr. Dearborn stated, are hardships particularly for independent inventors and small business concerns to whom patents are vital. Large corporations, he said, are less dependent upon patent protection, and they have greater resources to prosecute patent suits.

"America is on the threshold of its greatest technological advance," remarked Mr. De ar born. "New inventions will create new products and processes which will provide employment for many in the postwar period.

MACHINE TOOL BLUE BOOK



PROMPT SHIPMENT FROM STOCK - ESSENTIAL TOOLS TODAY

because they save hours of time, prevent costly breakage and long shut downs.
STEELGRIP Standard Rigid Arm Gear and Wheel Pullers are of improved design. Will not alip from work. Arms are forged and heat-treated. 2-arm, 3-arm and special models. I2 types and sizes.
CHAINGRIP Universal Pullers pull wheels, solid gears, pinions, etc., even at considerable distance from end of shaft. Proof-tested chains have hoth chain hooks and special pulley hooks. 3-ton and 12-ton capacities.

Write for Catalog Sheets.

ARMSTRONG-BRAY & CO.

"The Belt Lacing People"

5364 Northwest Highway, Chicago, U. S. A.

MILLING MACHINES Make Fast Work of Small Jobs

Motor Driven

Timken roller or ball bearings to spindle

Write today for circulars.

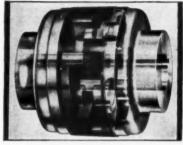


Burke Machine Tool Co. 297 E. 16th St., Conneaut, Ohio

NGENIOUS NEW PRINCIPLE MULTIFLEX COUPLINGS

THREE UNIT SAFETY SMOOTH DESIGN

PATENT NO. IITISS



A MASTER-PIECE FOR PRODUCTION

Today - and in the tomorrow - the transmission of power is a vital factor. MULTI-FLEX COUPLINGS were designed to transmit that power under all conditions. MULTI-FLEX COUPLINGS give greater MULTI-FLEXIBILITY against heavy shock and pulsating loads in any direction, also compensating for ANGULAR and PARALLEL MISALIGNMENT. So — for insured production order MULTIFLEX COUPLINGS.





These are the NEW

DUBLIFE Plug Gages with

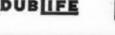


Reversible In one and same balanced handle 2 "Go's" and 2 "No Go's". Tolerances to .00002. Reverse either plug when it shows wear, and you have a fresh new gage. Time saving! Gage saving! Money saving! Ask representative to show you new Dublifes with Colored Collets and New light weight handles. Complete Catalog shows other U. P. Gages of A. G. Design.

Wire or write.

Color identifies plug instantly. Weight reduced. Secure locking. No slips. No marring or scratching of plugs as with metal. NEW LIGHT-WEIGHT HAN-DLE, with these new collets.

DUBILFE



UNITED PRECISION PRODUCTS CO.

3522 West Belmont Ave., Tel. KEYstone 1120



CASTING SEALANTS

Monsanto Chemical Co., announces it has developed and placed in production, a new series of casting sealants, now used on B-29 bombers and other military air-craft, which frees the U.S. from dependency on foreign-produced tung oil for impregnation of aluminum and magnesium airplane parts.

Working against time and under conditions of utmost urgency, Monsanto research chemists at Dayton, and Spring-field perfected the new impregnants at a time when a shortage of tung oil threat-

ened to bottle-neck an important segment of the aircraft industry concerned with the production of B-29 bombers.

When the first sizable quantity of the synthetic sealant was ready for use, only two days' supply of the natural product re-mained in one of the largest and most important airplane motor factories.

Monsanto explains that finelymachined untreated castings made from aluminum or magnesium show a pronounced tendency to develop porosity. This does not affect their mechanical strength. nor does it alter their status of utmost essentiality to aircraft manufacture. The porosity, however, results in leakage of liquids and vapors in lubricating, cooling and hydraulic sys-

Bulletin X-100 a vailable from Monsanto Chemi-cal Co., Plastics Div., Springfield, Mass., gives full de-

Applied by vacuum-pressure impregnation the new sealants make a complete, three-dimensional permeation of the castings, filling the millions of microscopic hollows which they contain without changing their appearance or affecting precision tolerances. After being impregnated, the castings are heat-treated to change the impregnant from a liquid to rubbery solid form. Parts are usually fully machined before impregnation. The cured sealant has excellent stability under high engine temperatures, and provides greater sealing efficiency.

PORTAGE No. 4

HORIZONTAL BORING, DRILLING & MILLING MACHINE



 Designed and built to meet the need for speed and accuracy demanded of today's production.

WRITE TODAY

for fully illustrated bulletin giving detailed description of the many features of this Horizontal Boring, Drilling and Milling Machine. No obligation.

THE PORTAGE MACHINE CO.



FAST, ACCURATE SPACING

Graduated in thousandths, you have plus or minus.0005" at your fingertips with

DAYTON ROGERS

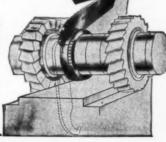
ADJUSTABLE

SPACING COLLARS

You can make an accurate, positive adjustment just by loosening the cutter arbor nut and making adjustment as illustrated.

Made in 12 standards for cutter arbors from 7/8" to 2". Write for illustrated Bulletin 120-7.

DAYTON ROGERS MFG. CO. 2849 12TH AVE. SO., MINNEAPOLIS 7, MINN. SIDE MILLING
CUTTERS
GANG MILLING
SET-UPS





for such tools by the carbide industry when the scores of new shell plants are in full production.

Meetings of shell producers and subcontractors at various key points thruout the country are being held by Army Ordnance at which the Carboloy developed Training Program will be discussed. Distribution of the course will be thru Carbolov District Offices. Carboloy field engineers and district managers in these offices are available to help individual shell plants put the course into operation

The complete course is designed to serve two definite purposes. In new shell plants it will provide basic training in the use of carbide tools in general, and will also give specific instructions in the use of carbide tools for shell machining operations. In shell plants where carbide tools have been in use for

some time, the training course will serve as a refresher and will also furnish new information on improved practices in machining which have been developed as a result of experiences in various shell plants.

The special training program, as developed by Carboloy, comprises:

1—The company's series of slide films on "Carbides", Grinding Carbide Tools", "Designing Tools", "Brazing", "Chip Breakers", and "Putting Tools to Work" (available at cost).

2-A newly developed set of 60 training charts, designed for group instruction.

SHELL TRAINING PROGRAM

In line with the need for tremendous acceleration in shell production, calling for a corresponding increase in utilization of carbide tools, Carboloy Co., Inc., Detroit, has developed an up-to-the-minute training program specifically designed to enable shell manufacturers to obtain better overall performance and increased service life from carbide tools.

The program, undertaken by Carboloy as a non-profit activity, is designed to assist in keeping consumption of critical carbide shell machining tools at levels corresponding to the available output rate



THREAD PLUGS THREAD RINGS PLAIN PLUGS PLAIN RINGS SNAP FLUSH PIN PROFILE BUILD-UP THREAD
CONCENTRICITY
JIGS, DIES
AND FIXTURES

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they get from our gauges.

DESMOND GRINDING WHEEL DRESSERS



Desmond Hex Dresser



Desmond Heavy-Duty Dresser



Desmond Huntington Dressers

Our Desmond Huntington Cutters are made in all sizes.



We manufacture only complete line of dressers and cutters on the market, and will be glad to send samples for trial. Write for copy of our new catalog and name of your nearest jobber.

THE DESMOND-STEPHAN MFG. CO.



Standard Zagar Air-O (Airoperated) Fixture used with new Warner & Swasey Precision Tapping and Threading Machine turns out one piece every three seconds! Fixture is tipped about 20° to load and unload. Standard 14-AC No. 2 collets are used. Merely stepping on treadle tilts for loading; releasing returns spindle to vertical. Collet does not move vertically in closing. Close tolerances in second operations easily held.

More work, better work, lower cost.



Also - Zagar SHORT Index Fixture

Designed for use on small milling machines, 1" and 2" sizes. All the advantages of Zagar Indexing Fixtures.

Get new Zagar Catalog "B5"

ZAGAR TOOL, INC. 23882 Lakeland Blvd., Cleveland 17



CARBIDE PROJECTILES

Details of its new "ore-to-core" plant to produce tungsten carbide artillery projectiles cores were announced recently by the Carboloy Ordnance Division, Carboloy Co., Inc., which will operate the new plant in Natrium, W. Va. The structure which will occupy 250,000 square feet will be located on a 72 acre site, and will enable a further vast increase in output of shell cores when completed.

It will represent, when completed, the largest tungsten ore reducing plant in the world and will be able to process

every type of tungsten bearing ore. Its location at Natrium will dovetail with the operation there of Columbia Chemical Works, producing chlorine. Hydrogen, needed for the reduction of tungsten ores, is a by-product in producing chlorine. Necessarv tungsten ore has already been pro-

Production of tungsten carbide shell cores was undertaken by Carboloy last July. Since that time, requirements for tungsten carbide cores by the Army have been multiplied many times to combat the new series of German Figer and Panther tanks.

Ability to produce shell cores in the quantities already manufactured and contemplated has been made possible in large part by several developments by Carboloy. Among these is the ability to produce

tungsten carbide cores to Army specifications as to weight and size tolerances, without requiring grinding of the extremely hard core. This is particularly important since diamond impregnated wheels are virtually the only type which could be used to cut this hardest of metals made by man.

Ability to use more readily available nickel instead of critical cobalt for the binder is of major value too, while even more important in some respects is a process developed by Carboloy thru which "scrap" tungsten carbide can be used in core production.

PRECISION ROTARY TABLES



9"-\$ 97.00

12'' - 160.00

15" — 185.00

18" - 220.00

18" - 350.00 Extra Heavy Duty

OUR ROTARY TABLE WILL TAKE THE PLACE OF A COSTLY FIXTURE. IT IS USED FOR ALL KINDS OF WORK ON MILLING MACHINES, SHAPERS, DRILL PRESSES AND HORIZONTAL BORING MILLS.

WE CAN ALSO FURNISH DIVIDING ATTACHMENTS.

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FAST DELIVERY GUARANTEED.

Send for Literature of other tools.

LAFAYETTE TOOL & SUPPLY CO.

128 LAFAYETTE ST.

NEW YORK, N. Y.





DIAMOND CALME TOOLS

Diamonds vary in quality and it is important to use the proper kind for a given job. "Bargain diamonds" are not an economy.

If you don't know diamonds know your diamond dealer. Our 45 years in this field merits your confidence.

ACME DIAMOND TOOL CO. 15 MAIDEN LANE, NEW YORK, N. Y.



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MOTOR DRIVE

Prompt Shipment



Save floor space, save power, and eliminate line shaft expense by installing MODERN MOTOR DRIVES in your plant. All drives are ball-bearing equipped and designed to fit practically every machine tool. Soundly engineered for long life.

MODERN MOTOR DRIVES DIV. NICHOLS ENGINEERING CO.

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Labor and Time

Eliminate heavy lifting. Cut handling Table

swivels and locks in any position. Can be varied 151/2" by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

Send TODAY for illustrated catalog No. 2.

MIDWEST TOOL & ENG. CO. 112 Webster St., Dayton, Ohio

HERCULES HOLDERS

Especially suited for parts numbering on steel, stainless steel and alloys, castings, brass, etc., these HERCULES Holders are available in both hand and press style, for one or two line convexed or concaved marking. No parts to loosen or wear out, type is instantly interchangeable by finger pressure on clip. Made of shock-resisting steel. Write for literature.





For simplified gang-stamping with faster interchanging of type

Immedial FROM STOCK FAVES-SILENT BAKFLITE GEARS

No waiting when you order Greaves Silent Bakelite Gears. . We have them in stock NOW! . Your order will go forward immediately. . You'll appreciate the silent operation and added smoothness provided by Greaves Silent Bakelite Gears. . You'll marvel at their great strength to carry big power loads . . . their remarkable ability to

successfully operate completely submerged in water. · You'll welcome their low cost. . No metal reinforcements required. . Save Time . . . Money . . . Labor! We also make silent gears of rawhide and Fabriol. Write for Circular.





earles MACHINE TOOL CO 2013-13 Eastern Ave. Cincinnati, Ohio





DYKEM STEEL BLUE STOPS LOSSES making dies & templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information.

THE DYKEM COMPANY 2301G N. 11th St., St. Louis, Mo.

(In Canada: 444 Pacific Ave., Toronto, Ont.)



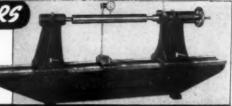
... And Save Your Worker's Temper!

Vises that don't hold in the clinches sap worker morale and tend to reduce output ... that's why cost-conscious shops pick Parker Vises. Made by America's first visemaker with a century of know-how, the Parker is engineered for long life. Renewable pinned-on steel iaws...non-slip handles... solid underportion - other features. The Charles Parker Company, Meriden, Connecticut.



BENCH CENTERS

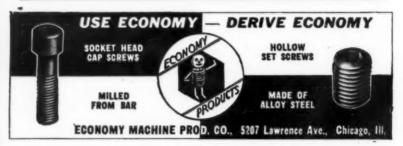
Removable Centers are tool steel, hardened and ground. Equipped with screw tailstock. Made in sizes to swing diameters of 12", 18", 21". 24", with base 36" and 48" between centers.



HIGAN DRILL HEAD CO. 971 E. 8 MILE ROAD HAZEL PARK, MICH. 971 E. 8 MILE ROAD

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AMERICAN TOOL WORKS, INC. 26 FRANCIS AVE. HARTFORD, CONN.







SAVE MONEY ON TOOLS!

Circular Relief Grinding leaves no "land" gives longer-lasting edges . . . assures you 3 to 5 times more wear per grind. Each regrind is better than the original "factory" grind. You can do this with only one weather every simple execution.

one machine, one simple operation.
Use coupon to get full information. See how easily you can save money on tools, just like Boeing, Jack & Heintz, Goodyear Aircraft, Packard and many others. Even inexperienced men can get amazingly good results with this time-tested Grinder.

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Please send illustrated folder and full information on how the Circular Relief Grinder will save money on sharpening tools.

FIRM

ADDRESS .



1"

Write for circular.

FOR FASTER STOCK REMOVAL, UNIFORM SIZE AND SMOOTH FINISH, you'll find NEUBERT BAR TURNERS fill the bill.

They are easy to set up, hold to size, and operate with heavy cuts and feeds and roll the work to a smooth, burnished finish.

Speed your production with NEUBERT BAR TURNERS.

Three sizes.

Quick delivery.

 %" capacity
 \$ 68.00

 1" capacity
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Precision Cutting Tools

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MULTIPLE

Simplified



Here you have only one receptacle to watch and keep filled—a time saver and an assurance of dependable lubrication. Gits "MD" Sight Gravity Feed Multiple Oiler is a simple, practical and economical means of lubricating from 3 to 12 individual points from a central reservoir. Large capacity, transparent unbreakable plastic reservoir provides clear vision of oil contents at all times. A shut-off valve is located at the top of the trans-

parent reservoir to prevent oil flow to the horizontal oil chamber when machines are not operating. Each drip fitting is equipped with an individual needle valve adjustment for regulating flow of oil, which can be locked against vibration. Ask for complete information on range of models and prices. Gits Catalog No. 60 illustrates and describes a full line of Oilers, Oil and Grease Seals and Lubricating Devices—write for your copy.

GITS BROS. MFG. CO.

1860 South Kilbourn Avenue, Chicago 23, Illinois

Exclusive for over 35 years

BLASTING TOKIO

A part of "Shangri-la", it was revealed recently, lies on the shores of the Chesapeake. With U. S. planes by the hundreds hammering at Japan, it is now disclosed by The Glenn L. Martin Co., Baltimore, Md., that special synthetic rubber fuel tanks provided the added cruising range which made possible the initial Doolittle raid over Tokyo.

For the first time it can be told that an extra 163 gallons of high octane gas in these flexible, fluid-tight Mareng ("Mar" for Martin, "Eng" for Engineering) cells, specially adapted to the occasion, added approximately 500 miles to the emergency cruising range of each of the B-25 Mitchell bombers which ploneered the skyroad to Tokyo in April, 1942. Since the planes actually took off from their carrier-base several hundred miles farther out at sea than had been planned, those 500 extra miles provided the margin between success and failure.

It was in January. 1942, that Colonel Frank Cook, at Wright Field made a hurried long distance call to Martin engineers. He requested them to design and supervise manufacture of a flexible fuel cell of the non selfsealing variety, to fit into a specified cavity in the fuselage of a Mitchell bomber.

Patent rights on a cell of this type, capable of being manufactured to fit any empty space desired, had been assigned to Martin in December, 1937. This was the origi-

nal Mareng cell—a development preliminary to the Mareng self-sealing fuel tanks with which the Martin Marauder was the first U. S. military plane to be equipped.

"We want as much gasoline as you can get into the crawlway of the B-25", Colonel Cook told the engineers. He added that the project was both secret and urgent.

So the engineers went to work. They had only a few weeks to complete the job, and no first-hand information to guide them. All the measurements supplied were contained in one blueprint.

BALANCING WAYS

Shops handling rotating parts find this simple, sturdy and thoroughly dependable device highly efficient for balancing and truing operations. It assures better work . . . saves time . . . saves labor. No leveling required.

Four chilled iron discs rotate with minimum friction on sensitive special bearings, giving a quick, accurate indication of whether or not the work is in perfect balance,

Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000



Buy More BONDS



Send for BULLETIN 5-5

HART'S Machine Vise Jaws



These Jaws are useful on any machine table. The angle holding the work down. Suitable to clamp or bolt to table. The hardened tool steel jaw measures 3"x6" $\frac{1}{2}$ " thick angle edge serrated.

HART'S Milling Fixtures

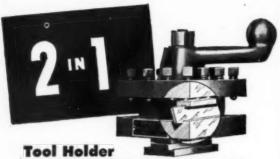
DORCHESTER, BOSTON, MASS.



These fixtures will make themselves popular and profitable in your shop. Easily kept clean to receive the work. May be used in either horizontal or vertical position. Suitable to hold round, hexagonal, octagonal, or square stock, aligning the work with the machine. Grip holds the work on the bottom as well as on the back. Shipped in pairs, unless otherwise ordered. Made in 4 sizes—to hold stock from ½ to 5 inches.

HART MACHINE CO.

When writing for descriptive circular kindly mention the BLUE BOOK.



and Cut-off Bit included with the Crozier Tool Post Turret at NO ADDITIONAL CHARGE!

Standard equipment with the accurate, high quality Crozier Tool Post Turret now is a specially designed holder and a high speed steel cut-off bit—at no extra charge! Not only is this exclusive feature (Patent Applied For) an immediate money-saver, it also increases production, provides more rigid tool support and reduces set-up time. The Crozier Tool Post Turret, the first to be made for bench lathes, retains its normal advantages of fast, close indexing, dependable accuracy and long life which have made it so popular. It is available for Small, Medium and Big lathes — with cut-off holder and bit without additional cost, remember. Write for details.



CROZIER MACHINE TOOL CO., PRAIRIE AT 118th ST., HAWTHORNE, CALIF.
Successors to C-W-C Corporation

X-RAY'S 50TH BIRTHDAY

One hundred years ago March 27, Wilhelm Roentgen, discoverer of X-rays was born, and exactly 50 years ago, November 8, he made his marvelous discovery of that wonderful ray which has since proven a boon to mankind and industry.

Roentgen called his discovery "X-ray" because he was at a loss to otherwise define this unknown quantity of great penetrating power. At the time, newspapers everywhere published stories, cartoons and even poems about the new "wonder rays." They printed ghastly skeletons of hands and feet of living persons and extolled the mysterious powers of these

strange rays which could "see" thru almost anything.

Within a few weeks after Roentgen's announcement. New York newspapers hit on the idea that the new rays might solve such age-old problems as spiri-tualism and soul photography. On e paper even reported that at the College of Physicians and Surgeons. Roentgen rays were used to reflect anatomic diagrams directly into the brains of students, thereby making a much more enduring impression than the ordinary or al methods of learning.

The stories and tales grad ually grew to such feverish proportions that the London Pall Mall Gazette came forth with the laconic statement:
"We are sick of the Roentgen rays."

With equal cruelty, one of Roentgen's fellow-country men published a statement that the Wurzburg professor was mercenary

-"selling his discovery to the world for what it would fetch."

On the other hand there were many strong believers in what Roentgen had found; especially medical men who foresaw how human suffering might be lessened by the ministrations of these new

Yet no one at the time dreamed that thin half-a-century, Roentgen's invention would be used by American industry in this war to build the toughest kind of fighting equipment—ships, airplanes, guns, tanks and even ammunition—to pulverize German cities, including Munich where the professor once carried on his research.

FISHER BENDER



This sturdy, hand-power bender will bend up to:

 $\frac{1}{2}$ " square or round iron 2"x $\frac{1}{2}$ " channel iron $2\frac{1}{4}$ " $\frac{8}{16}$ " flat iron cold

Immediate Shipment

Catalog No. 8 covering our line of benders, cutters, and punches available.

T. H. LEWTHWAITE MACHINE CO. 311 East 47th St. New York 17, N. Y.

THRUST BEARINGS



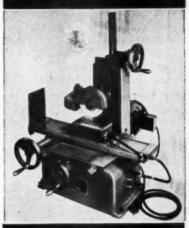
REGULAR OR SPECIAL DESIGN TO 24" O.D.

We also make Thrust Bearings interchangeable with other manufacturers.

> We take in extra work on Blanchard Grinders.

ACORN BEARING CO.
66 Stanley St. New Britain, Conn.

SANFORD



High-Speed BENCH SURFACE GRINDER

ACCURATE WITHIN .0001

A sensitive machine built to rigid standards of accuracy and workmanship specially designed "For the job that fits in your palm."

WRITE FOR BULLETIN

Available On M. R. O. Certifications

SANFORD MFG. CO.

1279-81 Springfield Ave. Irvington 11, N. J.



Above—a few of the many cuts that can be made with the Newfield Universal Fly Cutter in ONE operation on a borizontal or vertical mill or drill press. Individually adjustable bit bolders permit slots of any shape to be cut 3/16" to 1-1/2" wide.

For many types of milling light metals and plastics as well as steel, there is no longer need for special cutters. A single Newfield Universal Fly Cutter, utilizing any type of standard high speed steel or carbide bits, makes multiple cuts in one operation. In contrast with expensive specially ground cutters, the standard bits used in the Newfield are easily and quickly ground in your own shop, readily replaced or reground for other work, at small cost. There is practically no down-time if a bit is broken.

cally no down-time if a bit is broken.

The Newheld fits all standard arbors, turns to any required speed for By cutting, slotting, surface and straddle milling gear cutting, disc and gasket cutting. Standard sizes are 4", 6", 8", 10". Write for details of this versatile, production-upping, money-saving (ool.

NEW-FIELD MACHINED PARTS COMPANY

7160 Melrose Avenue, Los Angeles 46, California

"COLOR CONDITIONING"

A postwar program for scientifically "color conditioning" industrial interiors is announced by the DuPont Finishes Division following extensive study of employing functional color to improve employee efficiency, health, comfort and morale.

Described as the science of determining the correct industrial color environment for maximum vision, the system has been developed by Du Pont in collaboration with Faber Birren, leading industrial color authority. Among the benefits of "color conditioning" are listed increased production, improved quality of workmanship and reduced personal injuries.

The "color conditioning" technique is designed to protect emplovees against eyestrain by reducing glare and eliminating extreme contrasts between light and dark. It recommends restraint in using color, especially distracting, over-stimulating hues, as well as abolishing light - robbing dark areas.

Research findings have determined correct colors for factory walls, for machines and for backgrounds within the field of vision. Surveys of entire plants where an integrated color system has been in effect from front to rear door demonstrate that uniform wall, dado and equipment painting, with a change of pace for corridors, stair wells and wash-rooms, yields beneficial results as revealed in comparative safe-

ty, production and absentee records. Only a few colors in combinations need be utilized, the studies show.

The announcement emphasized that the program, altho designed to introduce more color into the industrial scene, is not mere "interior decoration" of plants, but the outcome of long-term research that already has done much toward "putting color to work" for industrial efficiency. Hundreds of case histories based on color installations in all types of plants were compiled and studied.

New colors have been developed for industrial interiors. These are not decorator's colors in the bright, clear range, but hues subdued in tone and practical.

No. 2 To No. 6

Screws Driven on this Husky but Sensitive Hopper Feed Screwdriver.

No handling of screws. Just place assembly on table, move from screw hole to screw hole. The machine does the rest.

Drives screws at one second each.

DETROIT POWER SCREWDRIVER CO.

2809 West Fort St., Detroit 16, Mich.



A USEFUL ADDITION

Modern precision machine shops and inspection departments will find this sturdy 36°x 48° MILWAUKEE SURFACE PLATE a valuable addition. Constructed of semi-steel, accurately machined, securely mounted on cast legs which are machined and provided with SAE adjusting screws for perfect alignment. Height from floor to top of plate 30°. Can also be had in 38°. Shipping weight 1200 lbs.

We also manufacture angles and parallels as shown underneath surface plate.



We also make larger and smaller plates either with planed or scraped surfaces, whichever is desired. Write today for full information.

J. C. BUSCH COMPANY

SINCE 1907

165 SO. BARCLAY ST.,

MILWAUKEE4,WIS





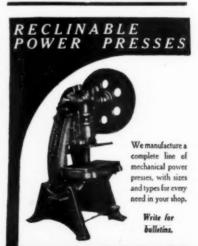
Price \$2.25 each DELIVERY
PAASCHE AIRBRUSH CO.

1952 Diversey Porkway, Chicago 14, Illinois Paasthe Alrbrush (Can.) Ltd., 110 Elm St., Terente





THE NEDCO COMPANY WALTHAM :-: MASS.



ZEH & HAHNEMANN CO. Newark, (5) New Jersey

MEASURING A PLUG GAGE with LIGHT. WAVES using an optical flat, a toolmakers flat and a gage block

The formula is:

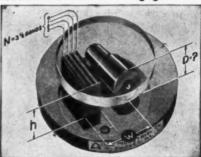
 $D = h + (.000012 \times N \times \frac{W}{W})$

Substitute the actual values

D=.750+(.000012 x 3½ x $\frac{17.6''}{23/64''}$)

D = .750168 inch.

It's just that simple!



Write for new, free Lightwave Measurement Booklet.



ACME INDUSTRIAL CO.

Makers of Standardized Jig and Fixture Bushings
210 N. Laflin St. MONroe 4122 Chicago 7, III.



The Tool with a Thousand Shop Uses!

Load Hammer with "Shur-Grip" Handle in use of Reynolds Machinery

Johnson "SHUR-GRIP" Lead Hammer!

Day In, day out, there are countless jobs that call for a lead harmer. To save precious man hours, many times lost through coatly harmer slips, equip your shop or plant thoroughly with SAFE Johnson "Shur-Grip" harmers. "SHUR-GRIP" handles give user a "buildage" grip and are almost indestructible. "SHUR-GRIP" handles used only with Johnson 3, 4, 5 and 6 lb. lead harmers. For illustrated folder and price list, write Dept. M.T.

JOHNSON TOOL COMPANY

PLASTIC MOLDS - TOOLS

REED TYPE 50 VARIABLE SPEED SENSITIVE DRILLS

This high speed hall bearing drilling machine is strong, rugged, and versatile. It provides an infinite range of speed from 44b to 3,000 rpm, and speed is shown on indicator. Capacity is 3,4" with a spindle travel of 6". All moving parts except spindle are enclosed for safety. These machines are available with any number of spindles. On multiple spindle units, a separate motor and drive is provided for each spindle.

Descriptive folders on request.

PRODUCTION MACHINE CO. Greenfield, Mass.



For AIRCRAFT and MUNITIONS



1883 Greenerd

The Originators
of the
Arbor Press

PRECISION WORK IN MANUFACTURING

65 Standard Styles and Sizes. Manually operated presses $\frac{1}{4}$ to 35 tons pressure. Motor driven hydraulic presses $\frac{1}{2}$ to 30 tons pressure.

Let us send you our catalog No. F.

GREENERD ARBOR PRESSES

NASHUA

Est. 1883

NEW HAMPSHIRE

AUTOMATIC STAKING MACHINE INCREASES PRODUCTION With Unskilled Manpower!



Outperforms conventional Riveters on numerous jobs.

A shortage of skilled workers won't upset your staking machine production if you use the Automatic Staking Machine which, even in unskilled hands, is fast, accurate and thoroughly dependable.

Uniform blow of hammer makes it ideal for riveting movable joints; can be quickly and easily adjusted for various jobs.

Available in Three Sizes

	1	1-B	2
Stroke	2"	2"	21/2"
Spindle	43/4"	43/4"	11/4" 81/2"

Now's the Time to Write for Descriptive Material and Prices.

WEBER MACHINE CORP.

59 Rutter Street

Rochester 6, New York

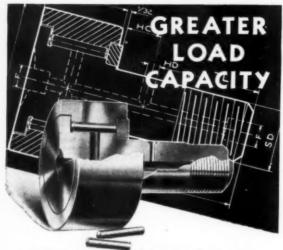


WILLEY'S CARBIDE TOOL CO.

SOLE MAKERS OF WILLEY'S MET IL

1342 W. Vernor Highway

Detroit 1, Michigan



McGILL Cam Follower Full Type Roller Bearings have a greater load carrying capacity for a given over-all width, and occupy relatively little radial space, as compared with plain bearings and ordinary ball bearing cam followers. Added advantages include effective sealing and the absence of small retaining washers or otherwise delicate extra parts. McGILL Cam Follower Roller Bearings are made in a variety of sizes. Write for Bulletin No. CF-40A.

Manufacturers of Ball and Roller Bearings

Mº GILL

Manufacturing Co., Inc. Valparaiso, Indiana

WESTINGHOUSE JET ENGINES

The new Westinghouse jet engine, prototype of commercial versions to follow, is the result of research and design studies in Company laboratories in South Philadelphia and in Pittsburgh which began Dec. 8, 1941, one day after Pearl Harbor. On that day Navy authorities climaxed more than two years of technical exploration by Westinghouse engineers with a telephoned authorization to undertake design.

Use of such compact, mechanically simple engines for aircraft drive—particularly in the realm of military and other high - performance operations - promises to establish new standards of streamlined design, speed and rate of climb for aircraft which are now in the development stage.

The gas turbine, when its propulsive power is applied thru the simple reaction jet, has the enormous mechanical advantage of having only one moving part. A typical internal combustion engine of comparable power has hundreds of moving parts, all of which must move in carefully-adjusted relation to each other. requiring very precise timing, and involving complex problems of vibration and lubrication.

In its present form as developed by Westinghouse, the jet propulsion gas turbine is a straight-line producer of power. All four of its major components—compressor, combustor, turbine and jet nozzle—are lined

up one behind the other in that order, so that power is not lost in changing direction of flow of the column of air that roars thru the turbine.

This 'straight-line' design is made possible by the use of an axial flow air compressor—a turbine in reverse which sucks enormous quantities of air into the engine

Thus the whole jet propulsion powerplant can be made much smaller, more compact, and more direct in its action than other designs using much larger centrifugal compressors. Air flows directly from compressor to combustion chamber.



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Fast set up and quick changeover are necessary if you are to profitably perform the many little jobs reguiring milling and jig boring . . . such as dies, jigs, metal patterns, models, etc. And you will also need these other features the Linley provides . . . 8 spindle speeds to 4250 r.p.m.; direct micrometer setting; velvet feed; grease-sealed bearings; ample table size $(7" \times 1712")$; small floor area $(1812" \times 20")$. . . which, with the Linley's compact, careful design, contribute to precision production at high speeds.

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269 Walker

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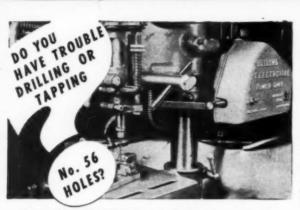
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Detroit 7, Mich.



ELECTROAIRE POWER FEED Is Cutting Spoilage and Tool Breakage Almost in Half

IF YOU drill, ream, or tap small holes the Bellows Electroaire Power Feed will help you obtain more production, with less tool breakage, and fewer work rejects.

At the touch of a foot pedal the Bellows Electroaire Power Feed advances the tool through the work with perfectly balanced feeding pressure. In drilling the feed automatically slows at the "break through", preventing "hogging" and drill breakage. Individual speed controls permit unlimited variation of feed and retraction speeds. In tapping the top can be made to almost. "float" out with no strain on the thread angle.

The Bellows Electroaire is enabling even comparatively inexperienced operators to produce precision work hour after hour with minimum physical effort—and, from honest records, with less than half the tool breakage, less than half the expected rejects.

Bellows Single actson Electroaire to fit 14" Drill Press, complete with foot control, Pressure regulator, pauge, automatic oiler and quick coupler. 110 volt, 60 cycle. Easily installed \$18.90.0 f. o. h. Akron, Obio. Other single or multiple action. Electroaires to fit any standard drill press, up to \$118.90. "Most inventions are the result of step - by - step progress over a long period of time and Edison knew this better than almost anyone else."

Mr. Folk, who was General Patent Attorney for A.T. & T. Co., for more than 20 years and author of the book, "Pat-ents and Industrial Progress. called attention to the fact that modern radio industry was born as a result of the perspiration and infinite pains" of Lee De Forest and others on the "Edison effect.

This "Edison effect," to day is recognized as the first observation of electronics on which all radio, television and radar apparatus are based.

Edison observed the electronic mystery in experimenting with incandes ender electric lamps, Mr. Folk pointed out, but it took 20 years of experimenta-

tion to develop it into the invention of DeForests's first radio tube. As further modern evidence of the truth in Edison's statement that genius, insofar as invention is concerned at least, depends on hard work, Mr. Folk cited several of the greatest inventions of recent decades.

"High-octane gasoline, one of the secrets of success of American aircraft, is the result of 30 years of research," he said. "More than 33,000 separate compounds were tried before the right one was found.

"Nylon came into being only after a team of 230 chemists perspired for ideas.

The Bellows Co.

AKRON 10, OHIO

THE EDISON EFFECT

Thomas A. Edison, who was born 98 years ago, once said that genius was one percent inspiration and 99 percent perspiration—and that definition of genius still holds true today according to one of his contemporaries and admirers.

"Edison was right," George E. Folk, patent adviser for the National Ass'n of Mfrs., said recently in paying tribute to the "wizard of electricity," who was born Feb. 11, 1847.

"Inventions are the product of genius only if we consider genius the infinite capacity for taking pains," Mr. Folk said.

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AIR CONDITIONING

To protect high precision accuracy in vital bearing plants, SKF Industries now uses air conditioning equipment with a capacity of 2,000 tons of refrigeration.

Installed by York Corp., engineers in the company's three plants including a new windowless blackout plant, the air conditioning is vital in safeguarding production of tons of bearings a day ranging in size from the diameter of a dime to six feet. A total of 550,000 cubic feet of cool, filtered air a minute is circulated thru the plants by means of a chilled water system and electrostatic air cleaners.

Air conditioning at SKF performs four



1—Helping to prevent stain-producing humidity from attacking finely finished bearing parts, or assembled bearings during handling, in assembly and final inspection.

2—Helping to maintain accurate dimensional controls not affected by varying outdoor climate conditions.

3—Keeping factory atmosphere free from lint and dust, dirt, vapor and grinding grit which normally collect on the oiled surface of bearing races, balls and rollers.

4—Preventing excessive summer temperature fromincreasing workers' fatigue and lowering efficiency and morale.

The smallest of several thousand different bearings made at SKF are ground to a surface finish accurate to one millionth of

an inch. This is about the same thickness as the film of moisture left by breathing on a mirror. Even a microscopic bit of moisture, such as perspiration on the hand, will attack the surface of a bearing and eat into its finish in time. Once in contact with the polished steel, it cannot be easily removed and the corrosion will continue until the bearing is repolished.

To guard against this before air conditioning was installed, SKF bearings carried a heavier coating of oil to protect them during handling. But this protection in itself created another hazard. The customary dust, grinding grit and haze collected more easily on the oiled surface.



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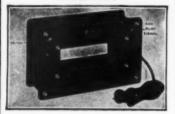
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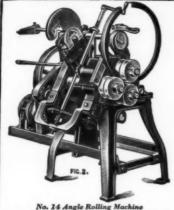
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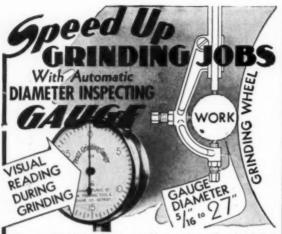
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WARMS PRESSURIZED CABINS

The new G-E Jet, one of the most powerful aircraft engines in the world, feeds warm air to the pressurized cabin of the Army Air Forces Lockheed P-80 in addition to carrying out its major operation of driving this speedy propellerless fighter, it is disclosed by the General Electric Co.

Air flows from the impeller-compressor of the jet engine into the enclosed cabin, where the pilot sits in relative comfort even when the plane is going at lightning speed in the substratosphere. Temperature of the air is controlled, making it unnecessary for the pilot to be swathed in heavy clothing.

The pressuriza-tion of the cabin also makes it possible for the pilot to breathe normally at altitudes of six miles and more without even wearing an oxygen mask

Another factor of the pressurized cabin, achieved thru this new tapping of the jet power, is that it reduces pilot fatigue. The lack of vibration made by this powerful jet engine also helps keep pilot fatigue at the minimum.

The G-E Jet is installed in the fuselage of the P-80 Shooting Star between cockpit and tail. It is far more powerful than any conventional reciprocating engine for aircraft.

This highly advanced engine is light and simple in design. Its light weight in relation to the tremendous thrust power pro-duced contributes to the maneuverability of the Shoot-

ing Star. Simplicity of the engine also has reduced maintenance problems sharply. For instance, the G-E Jet can be removed and replaced in a P-80 in a matter of minutes. It has only approximately 10 per cent of the number of moving and removable parts as the ordinary conventional engine.

Actual functioning of the jet engine is so simple that it sometimes is hard to understand. Air rams into vents in the front of the wings on the Shooting Star, al-most flush against the fuselage. It funnels to the engine, where it is compressed by a swiftly revolving impeller.

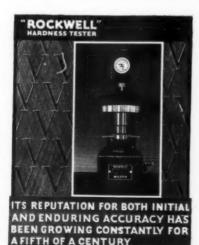






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A year ago, G-E announced an even

larger X-ray, one of two million volts, which will take pictures thru 8" of steel in one minute. Only two or three of the se have been made but results have been such there is every indication this bigger tube will soon gain the popularity and use of its one million volt predecessor.

And two million is not the limit, for already Dr. E. E. Charlton and his associate W. F. Westendorf, also of G-E research laboratory, have perfected a 100,000,000-volt X-ray but particulars of this giant are shrouded with secrecy until the war is over.

While X-ray is just what the doctor ordered for an accurate diagnosis in metallurgical inspection work, one of its greatest advantages from an industrial standpoint is speed. This has been made possible thru development of new supervoltage equipment and improved techniques. Both have

been combined to their fullest extent for maximum speed during the war. In American aircraft plants, X-ray units, ranging from 50,000 to 1,000,000 volts, are a big factor in boosting output.

Navy yards have found X-ray units almost indispensable in building battleships better and faster than the enemy. One million-volt machines are operating day and night in shipyards from Boston to Pearl Harbor.

X-ray still finds its widest use, however, in the fields of medicine. There is practically no region of the body that is not subject to its searching eye, MODEL No. 16 "SPECIAL"

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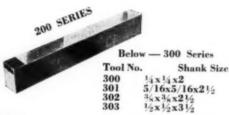
Left - 100 Series

Left Hand-Reverse Image, Right Hand Shown

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Tool No. RH	LH	Shank Size
R-100	L-100	1/4 x 1/4 x 2
R-101	L-102	5/16x5/16x21/4
R-103	L-104	3/8 x 3/8 x 2 1/2
R-105	L-106	7/16x7/16x3
R-107	L-108	$\frac{1}{2}$ x $\frac{1}{2}$ x $\frac{3}{2}$

Right — 200 Series
Tool No. Shank Size
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202 ¾x¾x½
203 7/16x7/16x3
204 ½x½x3¾x
204

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21/2	1/4	7/8	3.40	5	1/2	1	9.51
21/2	75	78	3.59	5	5/8	1	10.52
21/2	36	7/a	3.78	5	3/4	1	11.46
23/2	7.6	7/8	4.15	5	7/8	1	13.42
21/2	1/2	7/8	4.15	5	1	1	13.42
3	70	1	4.10	6	3	1	12.50
3	1/4	1	4.10	6	1/4	1	12.50
3	16	1	4.35	6	15	1	12.50
3	36	1	4.54	6	3/8	1	12.50
3	7 16	1	4.79	6	7	1	12.50
3	1/2	1	5.04	6	1/2	1	12.41
4	70	1	5.67	6	5/8	1	13.92
4	1/4	1	5.67	6	3/4	1 or 11/4	15.12
4	5 16	1	6.36	6	7/8	1 or 11/4	17.89
4	36	1	6.36	6	1	1 or 11/4	17.89
4	7	1	7.12	7	1/2	1 or 11/4	18.00
4	3/2	1	7.12	7	5/8	1 or 11/4	18.00
4	76	1	7.75	7	3/4	1 or 11/4	21.67
4	5/8	1	7.75	7	1	1 or 11/4	25.39
4	3/4	1	8.38	8	1/2	1 or 11/4	25.00
4	7/8	1	10.00	8	5/8	1 or 11/4	25.00
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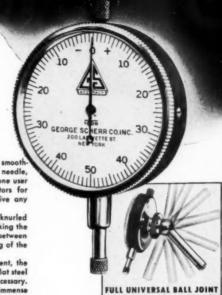
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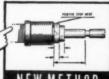
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